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**US ARMY CONCEPTS ANALYSIS AGENCY  
FY 91 ANNUAL REPORT**

**DECEMBER 1991**



**US ARMY CONCEPTS ANALYSIS AGENCY  
8120 WOODMONT AVENUE  
BETHESDA, MARYLAND 20814-2797**

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## DEPARTMENT OF THE ARMY

US ARMY CONCEPTS ANALYSIS AGENCY  
8120 WOODMONT AVENUE  
BETHESDA, MARYLAND 20814-2797

REPLY TO  
ATTENTION OF:

CSCA-MSP (5-5d)

10 MAR 1992

SUBJECT: United States Army Concepts Analysis Agency FY 91 Annual Report

1. The United States Army Concepts Analysis Agency (CAA) engages in a wide range of analytical activities which support the Army's strategic force role in executing U.S. national military strategy. These activities range from dynamic warfare planning and combat analysis, to developing theater- and regional-level scenarios and simulation models, and to assessing global strategies and broad military options. CAA's efforts in producing a broad range of comprehensive analyses were an important element influencing the Army's operational decisionmaking and future planning during fiscal year (FY) 1991.

2. The pivotal events of FY 91 proved even more extraordinary than those of the preceding year. From a CAA analytical mission perspective, these events were: the Persian Gulf War, the end of the Cold War and genesis of disunion of the USSR, the rapidly changing global strategic environment, and increasing mid to low intensity threats. These still unfolding events and their ensuing effects have profound implications for the future world order and are forging a new global operating environment for the Army. Since a large portion of CAA analyses focus upon how we plan, structure, posture, and employ forces, these events are expected to continue influencing the nature and scope of CAA's analytical support to the Army.

3. The events of FY 91 shaped the scope and operating intensity of the U.S. Army Concepts Analysis Agency's annual work program. During FY 91, CAA reached a new height in productivity and operating intensity. By fiscal year end, CAA had produced a record total of 98 distinct analytical products for sponsors. CAA also completed an additional 39 analytic efforts in support of these sponsored efforts. FY 91 analytical support was characterized by:

- An extraordinary level of analytical support to HQDA planning and operational support for Operations DESERT SHIELD and DESERT STORM
- A comprehensive series of analyses supporting the development of a new operations plan for US Forces in Korea
- A predominance of quick reaction analysis (QRA) efforts
- An increasing variety of sponsors
- A growing program of operational and strategy-oriented efforts
- An increasing focus on strategic options, appraisals, forecasting, and scenario development, and
- Greater productivity.

10 MAR 1992

SUBJECT: United States Army Concepts Analysis Agency FY 91 Annual Report

4. The Army Analysis Requirements for the Nineties (AAR-90) portion of the Army VANGUARD Study assessed the role and organization of the Army's analysis community for the decade of the 1990s. VANGUARD/AAR-90 decisions improved the Army's analysis capability by realigning and strengthening selected functions and reorienting the Army's analytical community around "centers of excellence." Within this architecture, CAA is designated the Army's Center for Strategy and Force Evaluation and its analysis role is formally expanded to link strategic assessments, broad military options, and political considerations with traditional specialty areas of military operations analysis. This comprehensive focus provides the modern construct for producing the more sophisticated, responsive analysis essential for dynamic decisionmaking in today's uncertain environment.

5. The strategic requirements of the United States and the strategic posture of the United States Army are being influenced by the depth and breadth of ongoing global change. Despite the overall trend of this change, the threat of intense conventional war on a regional scale and the more insidious dangers posed by the proliferation of weapons of mass destruction will persist. Since the consequence of change and its impact upon evolving U.S. national security interests is uncertain, the Army's central challenge will be to evolve a smaller and more flexible force posture strategy without dangerously eroding force capabilities.

6. The Army of the mid-1990s will be leaner but sized to meet global threat and security commitments. Establishing the proper strategic force balance, adjusting capabilities to successfully address diverse regional threats on a global scale, structuring a leaner, more agile force while maintaining adequate strategic and regional power projection capabilities, and reducing time required for partial and full mobilization are formidable issues which must be clearly addressed in our analysis, decisionmaking, and planning.

7. The compelling need to shape our future in an uncertain and fast-changing world places a premium on flexible and responsive analysis and decisionmaking. Expert analysis must continue at the forefront in: assessing alternative worldwide strategic environments, formulating deterrent strategies, accomplishing strategic force restructuring and contingency planning, and conducting affordability and tradeoff analysis in an environment of intense resource competition. Our success in resolving these difficult issues and planning for the future will in large part be determined by how well we integrate the dynamics of future uncertainty and change into the analytical process. The analysis process must be: more flexible (accommodating many alternative worldwide scenarios and issues), more sophisticated (involving political and regional considerations), more comprehensive (recognizing all relevant considerations), more responsive (providing timely analysis for decisionmaking), and more efficient (structured with a smaller analysis force).

CSCA-MSP (5-5d)

10 MAR 1992

SUBJECT: United States Army Concepts Analysis Agency FY 91 Annual Report

8. Unfolding global events and their security implications will likely continue to dominate the scope of CAA analysis support to the Army. CAA's expanded analytical mission and revised infrastructure improve our ability to assess, plan, structure, posture, and employ forces during contingencies and prepare for the future in a fluid, global strategic environment.

9. This report is a compendium of the Agency's activities during FY 91 and highlights significant contributions within the context of global and national events. It also articulates the agency's near-term future goals and strategy for meeting the US Army's future analysis needs.



E. B. VANDIVER III  
Director

Statement A per telecon Mark Clements  
CAA/CSCA-MSP  
Bethesda, MD 20814-2797

NWW 3/26/92

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**FY 91 ANNUAL REPORT**

**December 1991**

**Prepared by**

**MANAGEMENT SUPPORT DIRECTORATE**

**US Army Concepts Analysis Agency  
8120 Woodmont Avenue  
Bethesda, Maryland 20814-2797**

## FY 91 ANNUAL REPORT

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## CHAPTER 1

### INTRODUCTION AND OVERVIEW

#### 1-1. US ARMY CONCEPTS ANALYSIS AGENCY FY 91 ANNUAL REPORT.

● **Report Purpose.** The Fiscal Year (FY) 1991 Annual Report profiles the US Army Concepts Analysis Agency; highlights key elements of FY 91 mission performance; presents the current posture of the Agency; describes CAA's direction for the near-term future; and serves as the historical record of the Agency's activities for FY 91.

● **Report Organization.** This report is organized into the major components listed below.

The Director's FY 91 Annual Report Memorandum which-

- Summarizes FY 91 mission performance
- Profiles the state of the Agency and support to its customers; and
- Articulates the Director's vision for CAA's near-term future (1 to 3 years out).

Chapter 1 presents --

- An introduction to the FY 91 Annual Report (AR-91)
- An introduction to CAA and its organization
- A vignette of the Agency's mission, products and sponsors
- A background perspective of FY 91
- A profile of FY 91 analysis support
- A current posture statement
- CAA's focus for the future, and
- A summary.

Chapter 2 highlights selected CAA analysis activities which were considered to be of special interest.

Chapter 3 contains summaries of CAA analytical efforts completed during FY 91.

Chapter 4 describes selected technology research and analysis support activities.

Chapter 5 highlights internal CAA mission and management support activities and the stewardship of resources.

Chapter 6 chronologically lists all CAA analytic efforts completed in prior years.



## 1-2. CAA's ORIGIN, ORGANIZATION, MISSION, PRODUCTS, AND SPONSORS.

● **Origin.** CAA was formed as a result of the 1973 "Steadfast" Army reorganization study which combined missions, functions, and elements of part of the former Combat Developments Command (CDC) and the entire Strategy and Tactics Analysis Group (STAG), Figure 1-1. CAA was created to function as the central force analysis activity for the Department of the Army and its leadership.

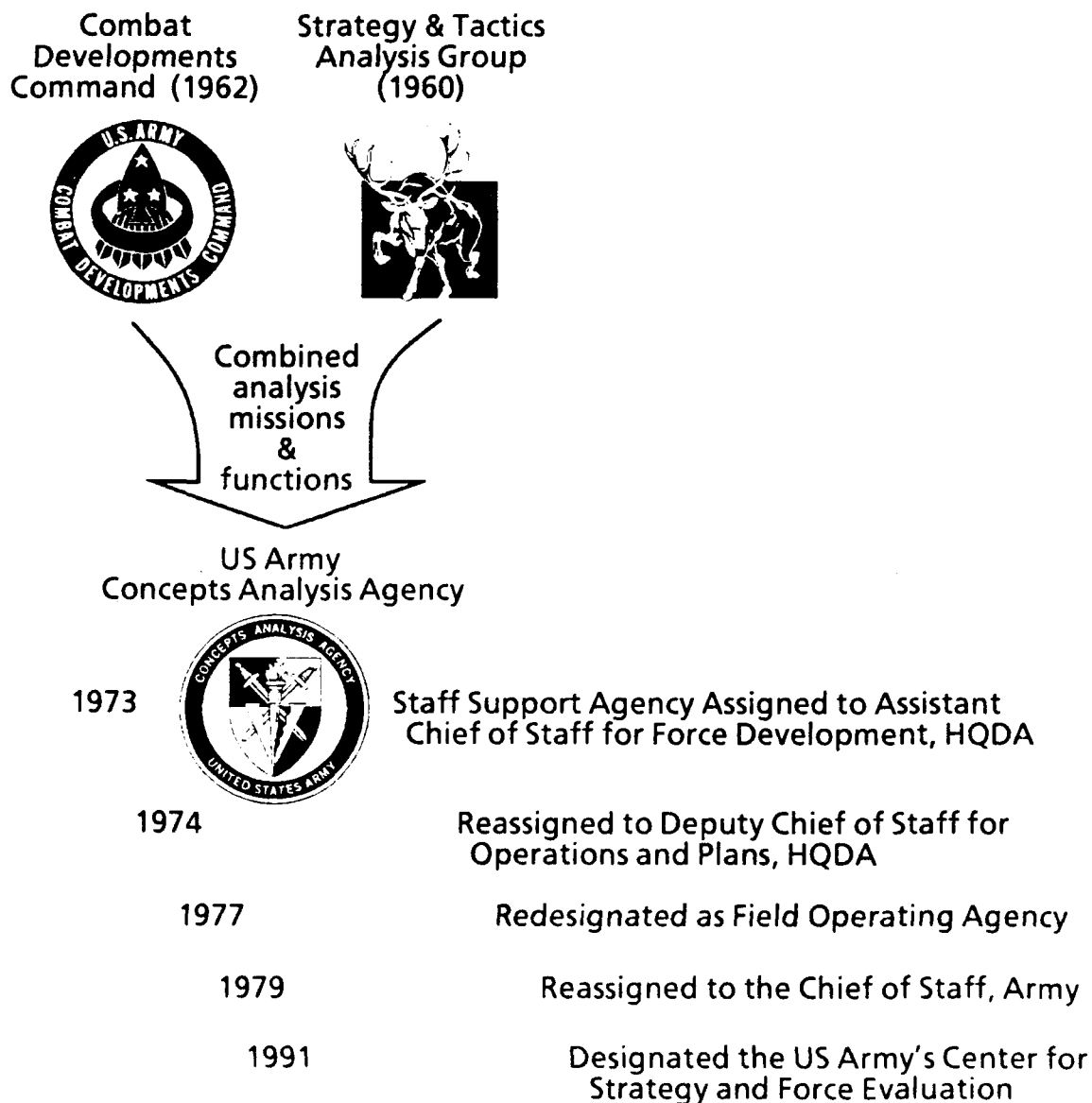


Figure 1-1. CAA History - 31 Years of Analysis Support to the Army

- **CAA Today.**

CAA has evolved over the years to its current organizational structure as a field operating agency (FOA) of Headquarters, Department of the Army (HQDA). While the primary role of CAA remains to support HQDA and Army leadership, its analytic activities have expanded to encompass a wide range of analytical services performed in support of virtually all Army elements, and occasionally other Department of Defense (DOD) and US government agencies.

In September 1991, CAA was designated the Army's Center of Excellence for Strategy and Force Evaluation as a result of Army VANGUARD Study recommendations for restructuring and realigning Army analysis agencies. While this designation does not change CAA's organizational title, it formally expands CAA's analytical mission to include assessments of strategic concepts and broad military options in addition to fulfilling its traditional analysis role. During October 1991 (beginning FY 92), CAA adopted the basic organizational structure shown in Figure 1-2 to accommodate its expanded role (details of the reorganization are provided in Chapter 5).

- **Organization.** CAA's organization is comprised of the Office of the Director; five directorates--Strategy and Plans, Force Systems, Force Evaluation, Research and Analysis Support, and Management Support; the Office for Operational Capability Assessments; and the Office for Data Management and Model Validation. CAA's restructured organization is represented by Figure 1-2.

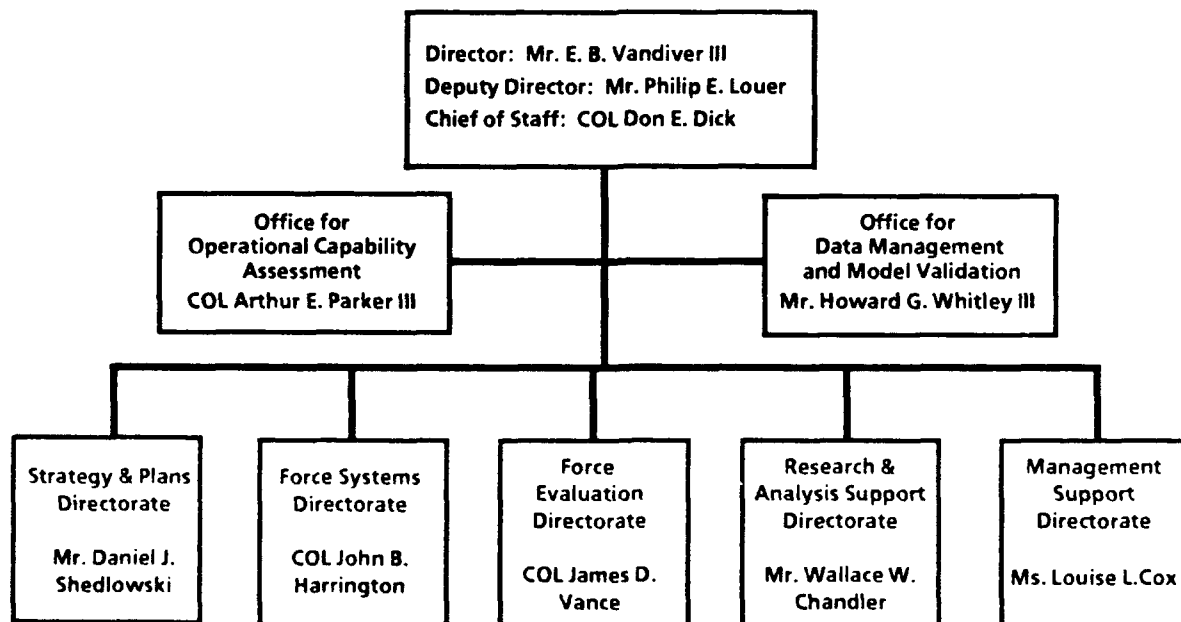


Figure 1-2. US Army Concepts Analysis Agency

- **The Army's Restructured Analytical Framework.**

A comprehensive analytical framework is indispensable for producing timely analysis critical to decisionmaking in the fast-paced environment of today and tomorrow. In today's uncertain and volatile planning and operational environment, our analysis must be more sophisticated and accomplished in a shorter timeframe if the results are to be a decisive element in shaping the future.

The Army Analysis Requirements for the Nineties (AAR-90) portion of the Army VANGUARD Study addressed the role and organization of the Army's analysis community for the decade of the 1990s. VANGUARD/AAR-90 decisions improved the Army's analysis capability by realigning and strengthening selected functions and reorienting the Army's analytical community around "centers of excellence." Within this architecture, CAA's analysis role is expanded to link strategic assessments and political considerations with CAA's specialty areas of military operations analysis.

The Army's modern analytical framework blends the dynamics of global strategies, political considerations, evolving worldwide security environments, and broad military options with traditional Joint and Combined military operations assessments (Figure 1-3).

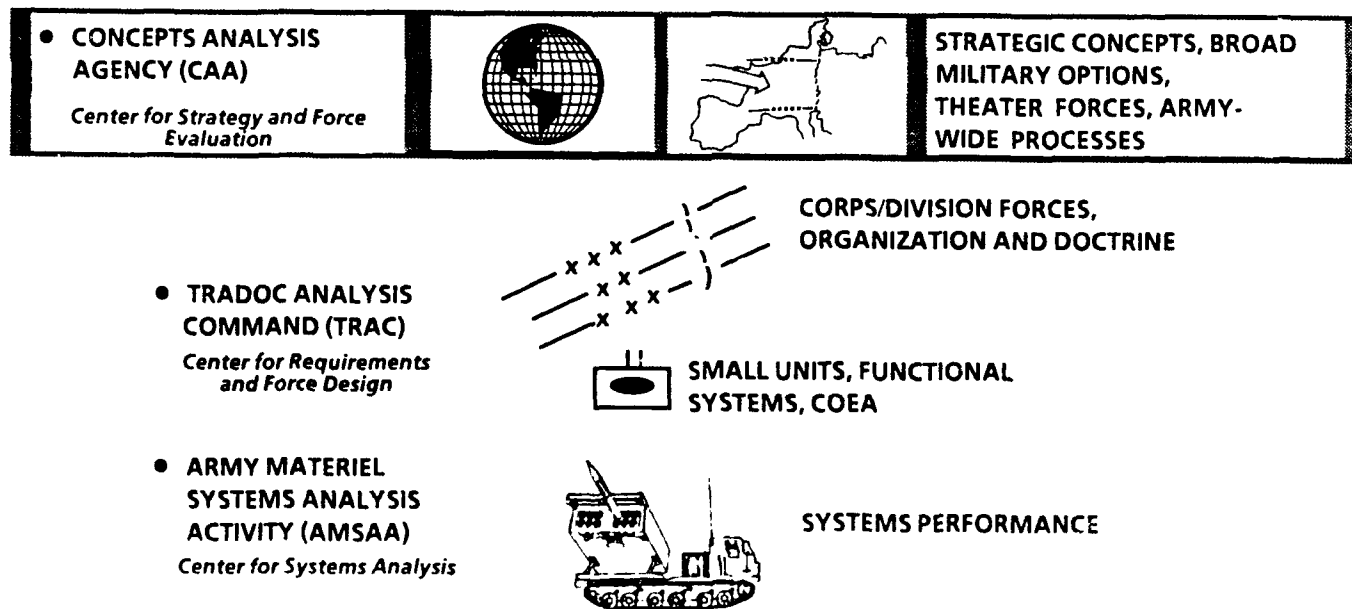


Figure 1-3. The Hierarchy of Responsibilities for Modern Army Analysis

- **Mission.**

CAA's mission focus and organization continue evolving in anticipation of the Army's changing analysis needs. CAA's recent designation as the Army's Center for Strategy and Force Evaluation formally expands CAA's unique

analysis role to encompass global strategic and broad military option assessments. This added dimension complements CAA's analysis role by completing the analytical framework for involving all the relevant considerations and influences required for comprehensive analysis in today's changing world.

CAA's restructured organization and wide analytical focus support the integration of: assessments of global strategic concepts and broad military options; theater- and regional-level analyses; and planning and operational assessments in the conduct of war (Figure 1-4). This focus provides the modern construct for producing the more sophisticated, responsive analysis essential for dynamic decisionmaking in today's uncertain environment.

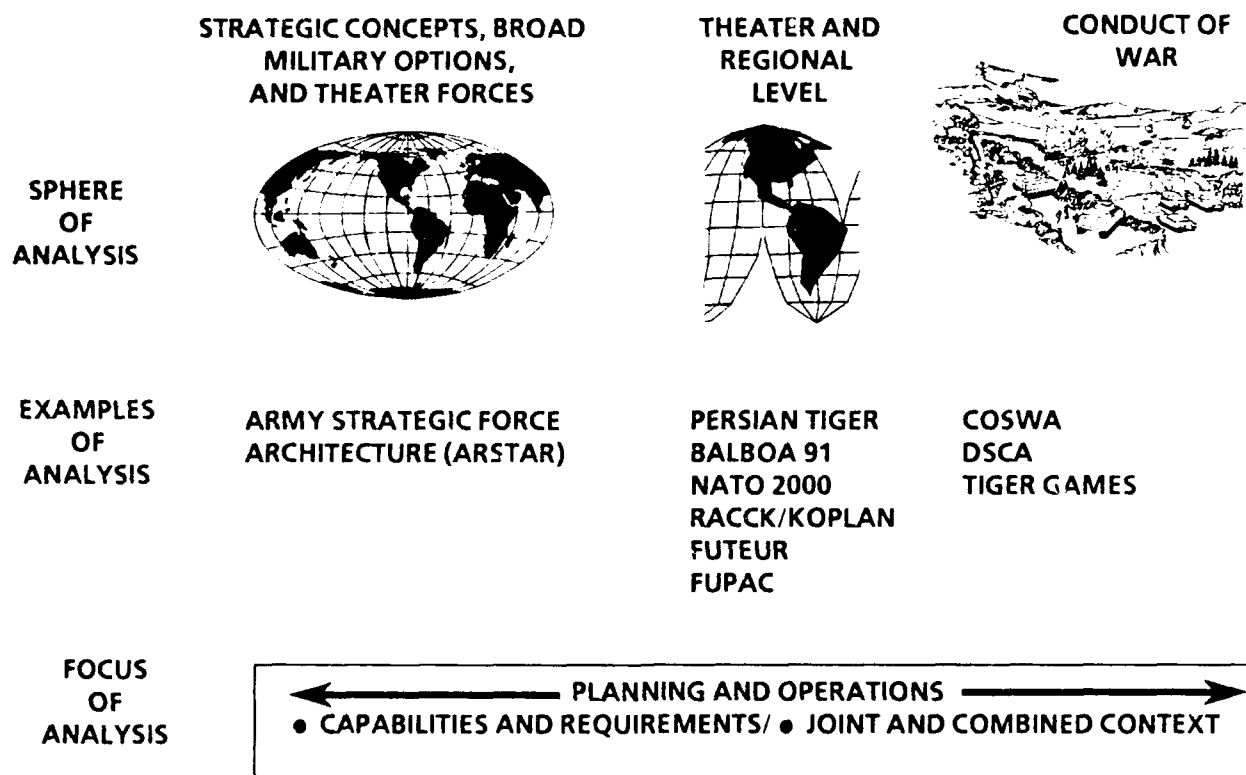


Figure 1-4. CAA's Broad Analytical Focus Supports Today's Decisionmaking Needs

Within the framework of its restructured mission, CAA is charged with maintaining Army analysis leadership within the Department of Defense in the areas of:

- Assessing strategic concepts and broad military options
- Assessing Army force capabilities and design
- Assessing Army capabilities to mobilize, deploy, employ, and sustain

- Evaluating force modernization programs, affordability, and trade-offs in support of the Planning, Programming, Budgeting, and Execution (PPBES) process

- Developing scenarios, methods, and models in support of its analytical mission, and

- Conducting research and development aimed at improving in-house analytical capabilities and leveraging advanced technologies, innovations, and efficiencies.

- **CAA's Unique Role in Theater-level Analysis.**

CAA has a unique role as the only Army activity given the mission of theater-level warfare analysis. Theater-level analysis is the capstone application of the collective efforts of the Army's analysis community (Figure 1-5).

The impacts of CAA's extensive theater-level analysis program extend well beyond the immediate issues involving the preparation and conduct of war within traditional theater scenarios. The capabilities and outcomes afforded by CAA's strong theater-level analysis program undergird most of CAA's analytic efforts in other areas. Theater-level analysis provides the analytical bedrock for conducting a wide range of analytical excursions and regionally oriented and quick reaction analyses required for solving many of the Army's most pressing issues.

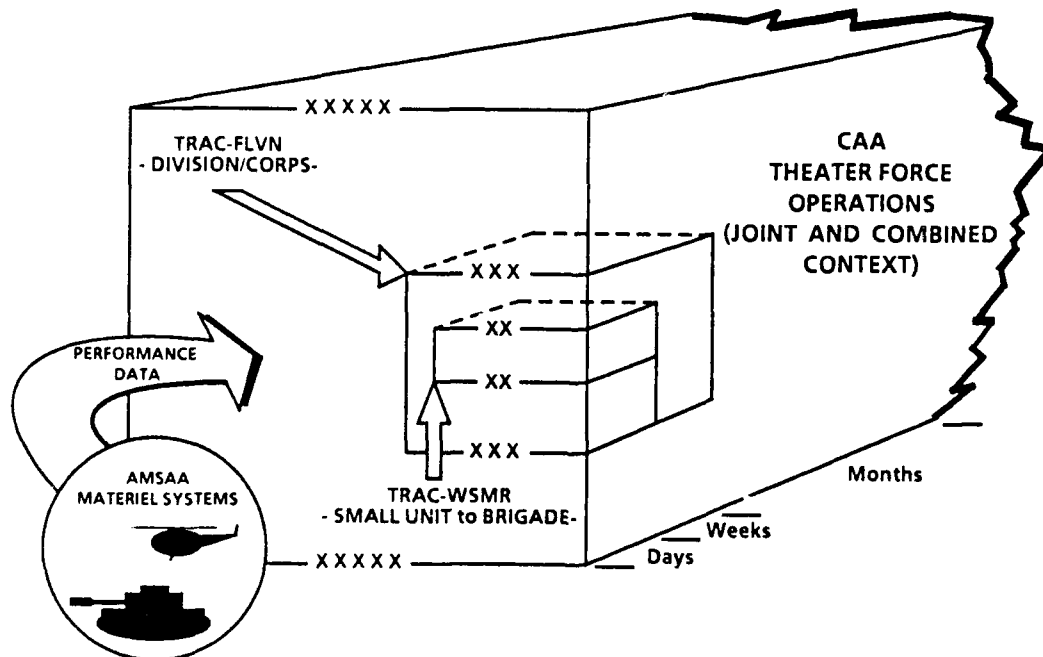


Figure 1-5. Theater-level Analysis - Capstone for Warfighting and Bedrock for Modern Analytical Framework

- **Products.**

CAA fulfills its analysis support role by producing analyses which address a wide range of needs and issues. On the upper end of the spectrum

they include assessments of global strategies and major theater-level and regional warfare studies which assess requirements and capabilities of Army forces in a joint and combined forces context. On the lower end of the spectrum, they address issues of narrower scope such as low-intensity warfare and drug interdiction.

Studies and quick reaction analyses (QRAs) are the primary products which CAA provides to its sponsors. The variety of sponsors seeking analysis support, the number of products completed, and the number of operationally and strategy oriented, quick-reaction efforts have steadily increased over the past 3 years. This increased productivity and operating tempo are depicted at Figures 1-6 and 1-7.

- The graph on the left in Figure 1-6 illustrates the increasing number of products CAA delivered to sponsors over the past 4 years.

- The graph on the right in Figure 1-6 illustrates that operationally and strategy oriented, quick-reaction efforts represent a growing percentage of the efforts delivered to sponsors

- Figure 1-7 illustrates the magnitude and pace of CAA quick-reaction support to Operations DESERT SHIELD and DESERT STORM.

Another large segment of CAA work involves developing and maintaining a wide variety of models and simulations, conducting research and analysis aimed at sustaining and promoting modern analytical capability, and performing special analytical projects.

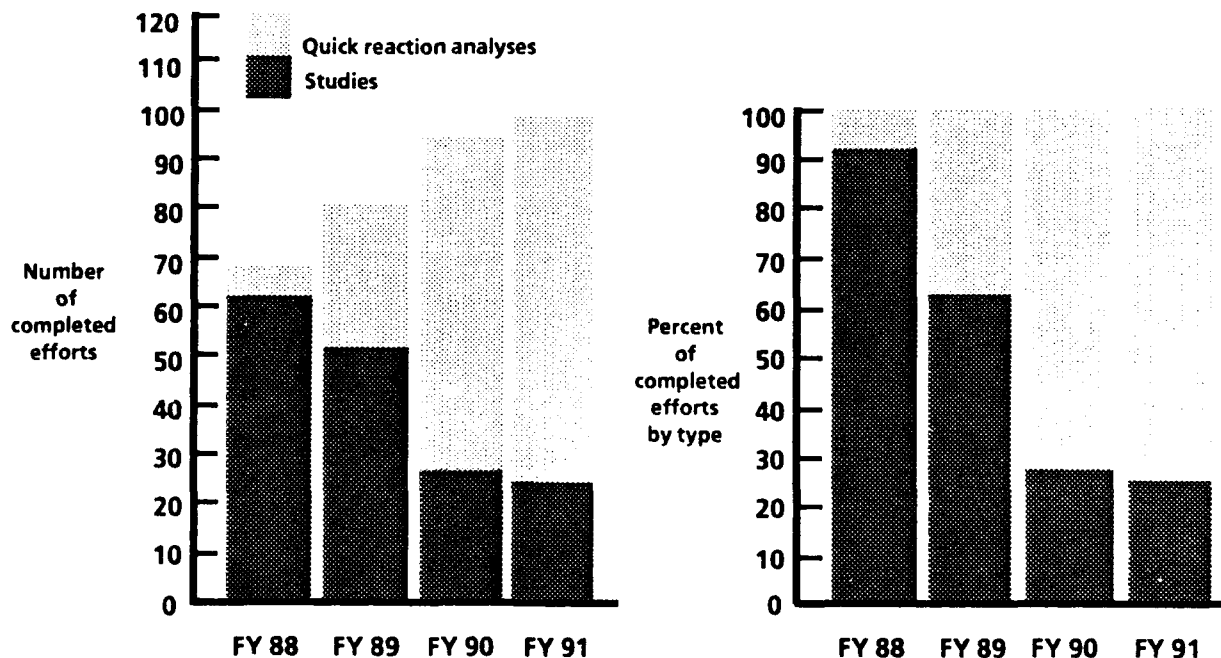


Figure 1-6. CAA Analytical Products to Sponsors

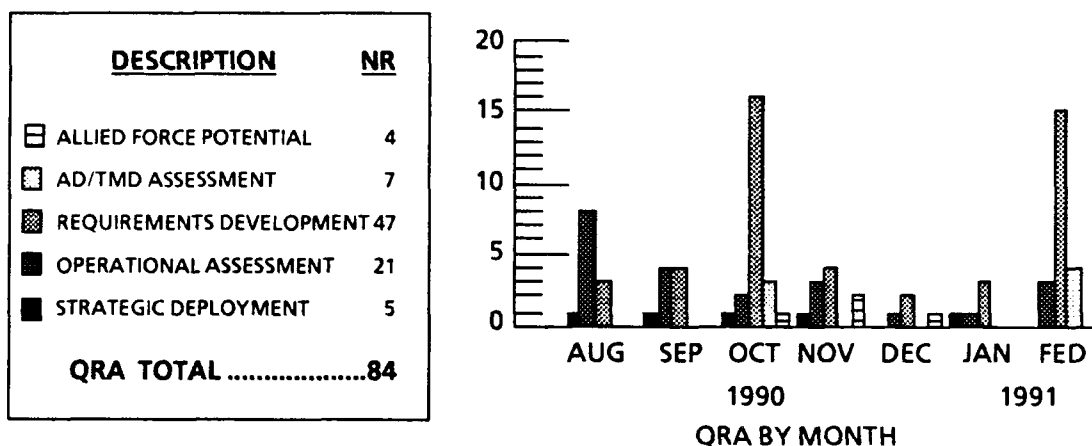


Figure 1-7. Magnitude and Pace of QRAs - Operations DESERT SHIELD/STORM

• **Sponsors.** Figure 1-8 presents a proportional breakout of CAA's FY 91 analysis support to Army sponsors. The "Other" category includes the Vice Chief of Staff Army, the Deputy Under-Secretary of the Army (Operations Research), the Director of Information Systems for Command, Control, Communications and Computers, and the Director, Program Analysis and Evaluation.

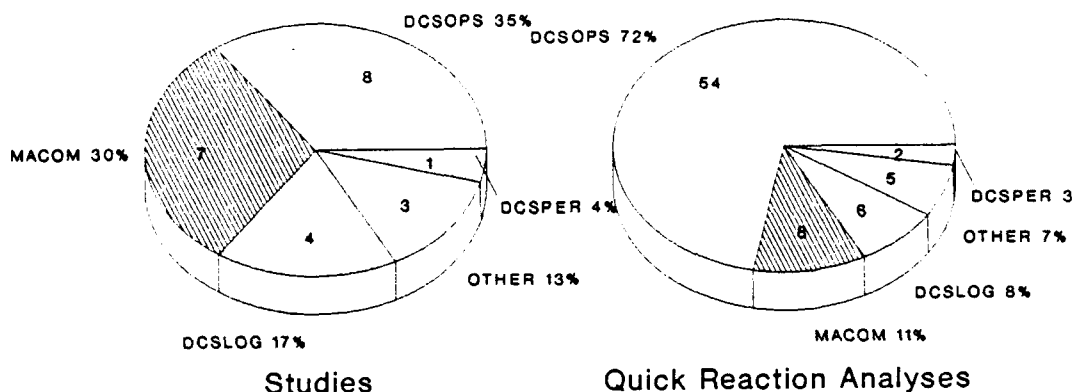


Figure 1-8. Profile of FY 91 CAA Analytical Support to Sponsors

### 1-3. FY 91 BACKGROUND PERSPECTIVE.

#### • Significant World Events and Trends.

The events of FY 91 proved even more extraordinary than those of the preceding year. From a CAA analytical mission perspective, the pivotal events of FY 91 were the Persian Gulf War, end of the Cold War and genesis of disunion of the USSR, and increasing low-intensity threats (narcotics,

terrorism, etc.). These still unfolding events, and their ensuing effects have profound implications for the future world order and the emerging global security environment. Since a large portion of CAA analyses focus upon how we plan, structure, posture, and employ forces, these events will likely continue as the primary influences upon the nature and scope of CAA analysis support to sponsors.

The events of FY 91 are forging a new global operating environment for the Army. The emerging global security environment remains uncertain; but it is presently characterized by: a decreasing threat to US and Allied interests in Central Europe; a declining threat of high-intensity conventional conflict between superpowers; an increasing threat of low- to mid-intensity regional conflicts and terrorism; widespread emergence of nationalism; and a rapidly increasing threat posed by the worldwide proliferation of weapons of mass destruction.

The Army of the 1990s is being increasingly confronted with a requirement for unprecedented flexibility: flexibility in tactical employment options, in strategic deployability, in our force structure, and in our analysis and decisionmaking.

At the close of FY 91, the major challenges confronting the Army are: establishing the proper strategic force balance; adjusting capabilities to successfully address regional threats on a global scale; and structuring a leaner, more agile force while maintaining adequate strategic and regional power projection capabilities. Meeting these formidable challenges will require superior, yet responsive, analysis from the entire Army analysis community.

The events of FY 91 were catalysts in achieving a new plateau in CAA productivity and operating intensity. Some of the central events which influenced the overall focus and intensity of FY 91 CAA analyses were:

#### The Persian Gulf War-

- UN sponsored military ejection of Iraqi invasion forces from Kuwait by United States and Allied coalition forces
- Enforcement of hostilities cessation agreement with Iraq
- Kurdish Relief Operations
- Middle East peace initiatives

The disunion of the USSR and the formation of separate nation states and dissolution of the Warsaw Pact-

- Popular referendum for Presidency of the Russian Republic
- The breakaway of the Baltic republics, widespread civil strife, and Yugoslavian Civil War
- Attempted coup by Soviet centrist hard-liners



- The collapse of Soviet hegemony over satellites and client nations
- The genesis of East-West reconciliation and shift to open market economies and more democratic forms of government

- Wide-ranging arms control negotiations and force reductions

The emerging world order and changing global security environment

- Unification of Germany
- Middle East and other regional peace initiatives
- Growing number of nuclear-capable nations and proliferation of other weapons of mass destruction
- The rising influence of regional powers
- Trend toward greater influence of international institutions
- Growing international difficulties triggered by differing national interests competing for increasingly limited resources
- Increasing efforts to counter threats posed by narcotics trafficking and terrorism
- Unilateral nuclear reduction initiatives by the President of the United States

#### Emerging Trends and Future Concerns

- Significant reduction of global Soviet power projection capabilities
- Changing regional power structures and formation of new power blocks
- Dissolution of the Warsaw Pact and deemphasis of NATO authority (Franco-German alliance)
- Maturation of the European Economic Council (EEC) and new defense agreements
- Global proliferation of nuclear arsenals and other weapons of mass destruction
- Potential for alternative worldwide strategic environments and deterrent strategies
- Major reductions in nuclear arsenals by superpowers
- Changing US defense posture with a leaner, more agile US force structure, albeit sized, equipped, and trained for global commitments

- Changing US national objectives
- Changing alliances and coalitions.
- Increasing worldwide competition for limited resources and economic assistance as more nations endeavor to transition to open market economies
- Severe and prolonged resource constraints
- Increasing focus on other national initiatives (e.g., drug interdiction and counterterrorism)

#### Impact on CAA Program.

Figure 1-9 illustrates some of the linkage between global events, the evolving security environment, and the focus of CAA analysis. Listed are some examples of CAA analysis which were performed to assess operational requirements and capabilities for warfighting and the impacts of global and national events upon the Army's future role as a strategic force.

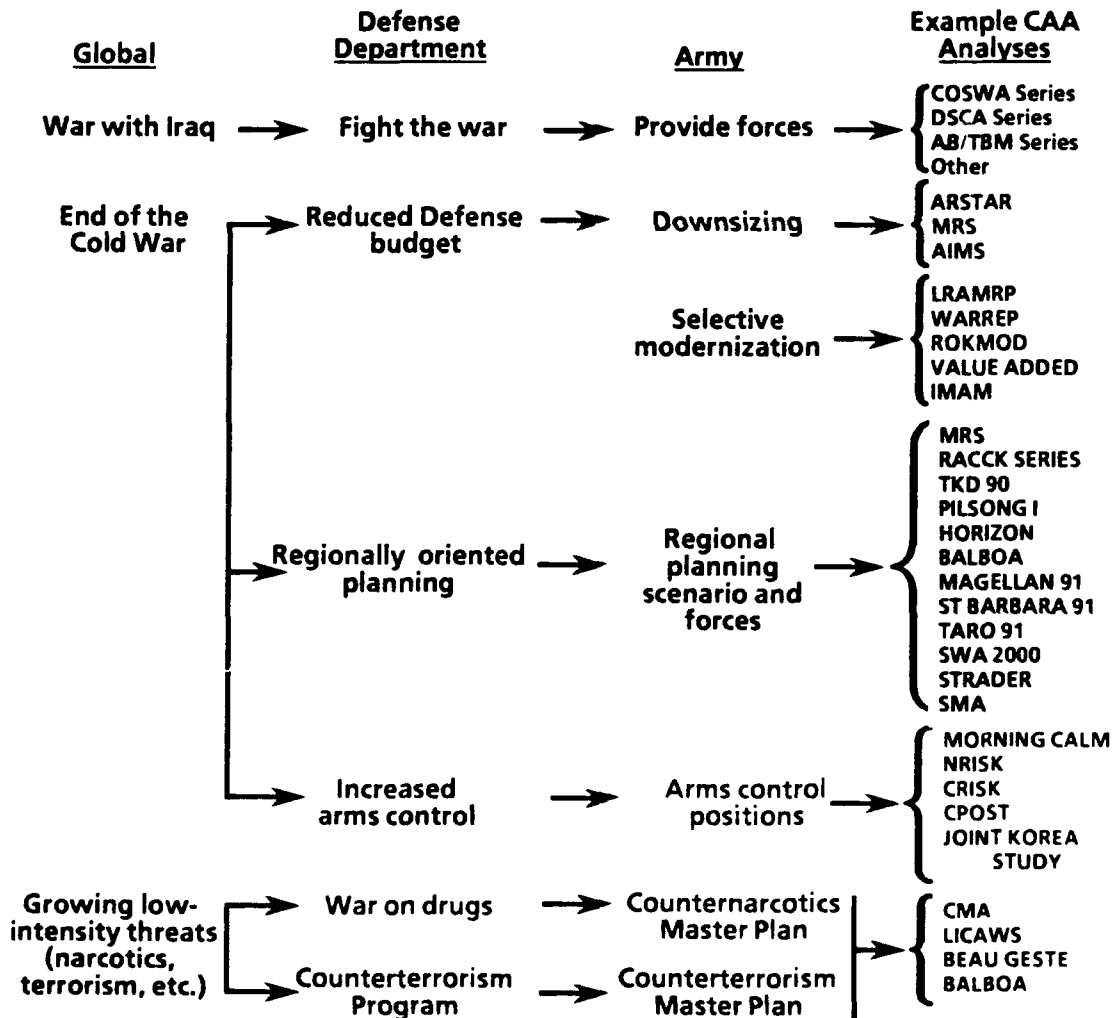


Figure 1-9. CAA Analysis - A Decisive Element in Shaping the Future

#### 1-4. PROFILE OF CAA'S FY 91 WORK PROGRAM.

● **Work Program Overview.** During FY 91, CAA produced a record total of 98 distinct analytical products for sponsors. This was an increase of 5 over last year's level which was CAA's previous annual production high. CAA also completed an additional 39 analytic efforts in direct or indirect support of these sponsored efforts. It is notable that this accomplishment was during a period of declining resources and is indicative of the initiative, hard work, and dedication of CAA's military and civilian work force. FY 91 CAA analytical support was characterized by:

- An extraordinary level of analytical support to HQDA planning and operational support for Operations DESERT SHIELD and DESERT STORM
- A comprehensive series of analyses supporting the development of a new operations plan for US Forces in Korea
- A predominance of quick reaction analysis (QRA) efforts
- An increasing variety of sponsors
- A growing program of operationally and strategy-oriented efforts
- An increasing focus on strategic options, appraisals, forecasting, and scenario development, and
- Greater productivity.

#### ● Categories of CAA Analysis Activities.

**Definitions.** The CAA Annual Study, Work, Evaluation, and Reporting System (ANSWERS) chart, at Appendix A, defines the categories of work efforts within CAA. Following are narrative descriptions of each category and their related performance criteria.

- **Study** - A major in-house or contract effort sponsored by HQDA on behalf of the Army or other DOD or government agency. The level of effort is usually greater than one-half a professional staff year (PSY). CAA documents results of studies with a Study Report.

- **Quick Reaction Analysis (QRA)** - A limited, quick reaction effort externally sponsored by a HQDA staff element which is accomplished in-house. The level of effort is less than one-half a professional staff year (PSY) and the duration is normally less than 6 months and frequently less than 30 days. CAA documents results of QRAs with a Memorandum Report.

- **Project** - An in-house or contract effort which is undertaken by CAA on behalf of an external sponsor. Projects can range from relatively low-cost, short-term efforts to major efforts equivalent in scope to a study. CAA generally documents results of projects with a Technical Paper.

- **Research and Analysis Activity (RAA)** - An in-house effort devoted to developing or improving analytical systems or techniques. Included are development of data bases and models to support the conduct of studies, QRA, and projects. The product or outcome is determined by the CAA approving authority.

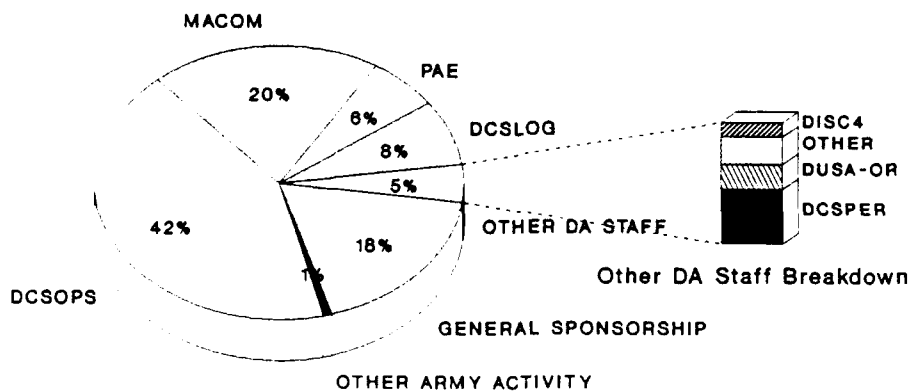
● CAA Work Program Summary.

A summary of CAA's FY 91 work program completions by analytic category and sponsor is provided at Table 1-1.

Table 1-1. CAA FY 91 Work Program Summary

Sponsor	No of studies	No of QRAs	No of projects	No of RAAs	Totals
DCSOPS	8	54	7	N/A	69
DCSPER	1	2	0	N/A	3
DCSLOG	4	6	0	N/A	10
DUSA-OR	0	0	4	N/A	4
Other DA staff	2	4	2	N/A	8
MACOM	7	8	3	N/A	18
Other Army	0	1	2	N/A	3
Other DOD	0	0	1	N/A	1
General sponsorship	1	0	3	19	23
Totals	23	75	22	19	139

Utilization of in-house CAA professional staff years (PSY) in support of major study sponsors during FY 91 is profiled by Figure 1-10.



Total CAA in-house PSY available in FY 91 was = 148

Figure 1-10. Sponsor Utilization Profile of CAA In-house PSY

## 1-5. CURRENT POSTURE.

● In many respects, FY 91 was a transitional year during which CAA continued reorienting its analytical resources and programs to focus upon priority areas of emerging Army analysis needs. This enabled CAA to successfully meet the intensive demand for quick reaction, dynamic planning and combat analysis in support of Operations DESERT SHIELD/STORM and to produce more strategy-oriented analysis in areas of emerging vital US interests outside of Central Europe (Figure 1-11). Conversely, the need for theater-level analyses in the Central European theater diminished as the USSR/Warsaw Pact threat receded.

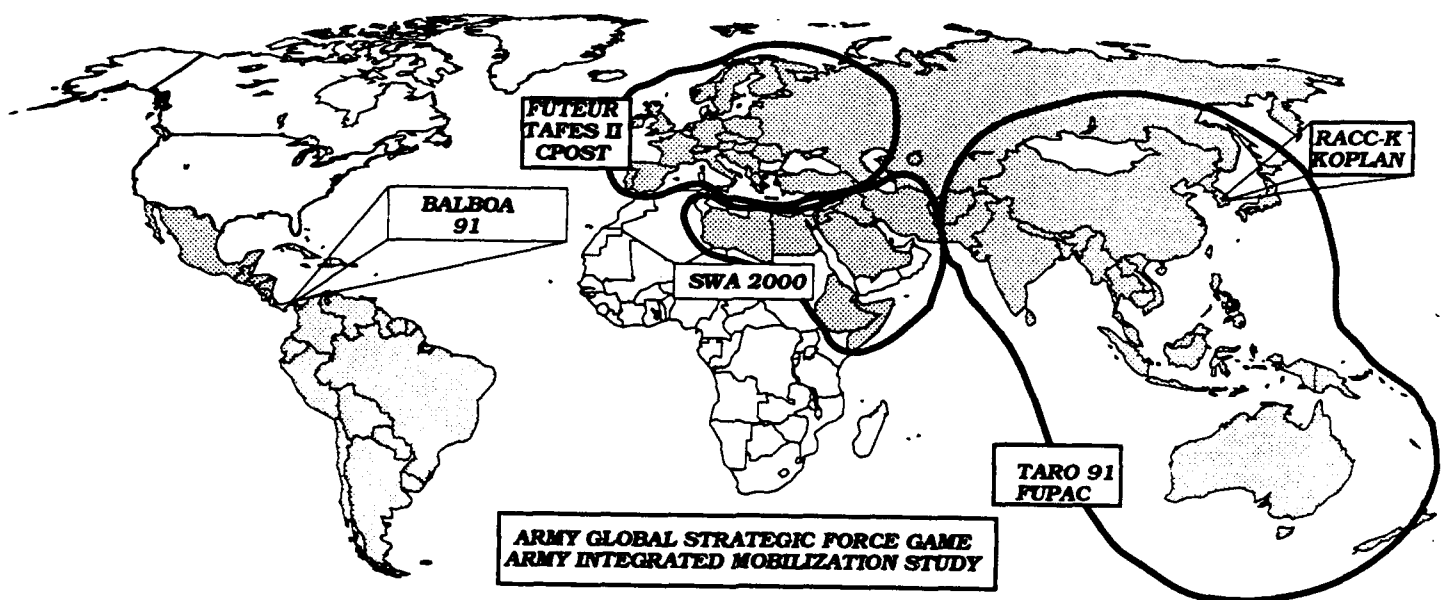


Figure 1-11. Examples of Shifting Analysis Focus

● At the close of FY 91, CAA is postured with analysis capabilities focused upon the following priority areas-

- Global strategies and broad military options
- Theater- and regional-level analysis in nontraditional areas
- Joint and combined issues
- Arms control, disarmament, and force reductions

- Special operations and low-intensity conflict
- Nuclear, chemical, and biological warfare
- Contingencies and online quick reaction analyses
- Support to other national objectives (e.g., narcotics interdiction),  
and
- Economic analysis

● CAA is actively pursuing improvements in the areas of:

- Scenario generation to include the political dimensions of military issues
- Coordinating analytical activities among sponsors and other analytic centers of excellence
- Responsiveness and flexibility
- Continuing to develop and refine quick-turnaround techniques
- Anticipating emerging analysis needs of sponsors (scenarios and issues)
- Adding new capabilities for the analysis of mobilization, low-intensity conflict, alternative global scenarios, and joint issues
- Instituting online analysis support to the PPBES
- Streamlining administrative and QA procedures
- Institutionalizing closer working relationships with HQDA staff, Army components of unified commands, OJCS, Army War College, the Strategic Studies Institute, similar international organizations, and analysis agencies of allied nations, and
- Efficiency and modernization by:
  - Completing local area networking
  - Exploiting advanced technology such as supercomputers and parallel processors
  - Constructing a new generation of analytical tools, and modernizing older ones
  - Selectively reducing nonpriority capabilities and tasks, and
  - Exploring opportunities for advancement in simulation technology and methodology through international cooperative programs.

## 1-6. NEAR-TERM (1 TO 3 YEARS OUT) OBJECTIVES.

● **Perspective.** Changing US national security strategy and adjusting the Army's strategic force role will be at the center of CAA analysis focus throughout the near-term future. Analysis must continue to be at the forefront in: assessing alternative worldwide strategic environments, formulating deterrent strategies, accomplishing strategic force restructuring and contingency planning, and conducting affordability and tradeoff analysis in an environment of intense resource competition.

The Army of the mid-1990s will be leaner but scoped to meet global security commitments. Meeting the challenge will require unprecedented flexibility: flexibility in tactical employment options, in strategic deployability, in our force structure, and in our analysis and decisionmaking.

At the close of FY 91, major challenges confronting the Army are: establishing the proper strategic force balance; adjusting capabilities to successfully address diverse regional threats on a global scale; structuring a leaner, more agile force while maintaining adequate strategic and regional power projection capabilities; and reducing time required for partial and full mobilization.

The potential for alternative future worldwide strategic environments and deterrent strategies must be carefully examined and clearly addressed in our analysis, planning, and decisionmaking.

The degree of success we will achieve in analyzing and planning for the future will in large part be determined by how well we integrate the dynamics of future uncertainty and change into the analytical process. The analysis process must be: more flexible (accommodating many alternative worldwide scenarios and issues), more sophisticated (involving political and regional considerations (dimensions), more comprehensive (recognizing all relevant considerations), more responsive (providing timely analysis for decisionmaking), and more efficient (structured with a smaller analysis force).

The Persian Gulf War underscored the need for CAA to maintain a full range of responsive theater-level analysis capabilities. Continued improvements in the capabilities and versatility of these models and expertise in their application remains a priority for the near-term future.

● **Objectives.** CAA will emphasize efforts aimed at:

- Maintaining the highest quality work force and productivity level possible within reduced staffing levels
- Expanding theater-level analysis expertise to encompass many other theaters and regions
- Assessing strategic concepts, broad military options, and operations plans

- Developing scenarios which incorporate the political aspects of military operations
- Strengthening analysis support to PPBES
- Strengthening capabilities for dynamic planning and combat analysis; continuing improvements in capabilities for responsive contingency and regional warfare analysis
- Evaluating mobilization and regional power projection capabilities and requirements
- Increasing capabilities for conducting analyses with joint service and combined force perspectives
- Conducting research and development aimed at improving analytical techniques and leveraging advanced technologies, innovations, and efficiencies
- Evaluating and restructuring the inventory of CAA models so that they are responsive to anticipated future issues
- Improving flexibility and responsiveness in our analysis process, and
- Expanding the application of proven Total Quality Management (TQM) techniques in CAA's analytical and management processes.

#### 1-7. SUMMARY.

The pivotal events of FY 91 shaped the scope and operating intensity of CAA's annual work program and were central to achieving unparalleled productivity. These still unfolding events and their ensuing effects will continue to have profound implications for the future world order and the emerging global security environment. The compelling need to shape our future in a fast-changing world places an unparalleled premium on flexible and responsive analysis and decisionmaking.

Uncertainty and rapid change make the process of analysis more complex. Not only must our analyses be more comprehensive, identifying and assessing all relevant dimensions, they must also be accomplished in a shorter timeframe if the results are to be a decisive element in shaping the future. CAA's analytical framework has been purposely constructed to support comprehensive, responsive, and technically sound analysis, yet retain the flexibility to adapt quickly in response to the dynamics of uncertainty and change.



The implications of still unfolding global events and their security implications are expected to continue as primary influences upon the scope of CAA analysis support to the Army. CAA's expanded analytical mission and revised infrastructure improve our ability to assess, plan, structure, posture, and employ forces during contingencies and prepare for the future in a fluid, global strategic environment.

Additional specifics of CAA analysis and mission support programs are contained in subsequent chapters.

## CHAPTER 2

### SPECIAL INTEREST ITEMS

#### 2-1. SUPPORT TO NATIONAL MILITARY STRATEGY AND THE ARMY'S ROLE AS A STRATEGIC FORCE.

- **CAA Analysis Support to Operation DESERT SHIELD and Operation DESERT STORM.**

- **General.** During the period August 1990 - March 1991, CAA conducted an extensive and continuous series of quick reaction analyses of the evolving Persian Gulf situation for Headquarters, Department of the Army (HQDA), Headquarters, US Army Central Command (ARCENT), and Headquarters, US Army Forces Command (FORSCOM). These analyses addressed issues concerning deployment, logistics, supportability, combat service support structure requirements, casualty assessments and replacement personnel requirements, ammunition and other materiel requirements, and development and assessment of numerous concepts of operation for both friendly and opposing forces. Most of these analyses were done on a time urgent basis, and some required results within 72 hours to influence critical planning decisions.

- **Applications of CAA Analyses.** The general areas of CAA's Persian Gulf analyses and primary users of results are shown at Table 2-1.

**Table 2-1. Areas of CAA Persian Gulf Crisis Analyses and Primary Users of Results**

Purpose	Provided to
Strategic deployment assessments	ODCSOPS ODCSLOG
Operational assessments	ODCSOPS ODCSLOG ARCENT
Requirements development <ul style="list-style-type: none"> <li>● Combat Service Support Structure</li> <li>● Personnel</li> <li>● Ammunition</li> <li>● Equipment</li> </ul>	ODCSOPS ODCSPER ARCENT FORSCOM
Air defense/TBM defense assessment	ODCSOPS
Allied force potential assessment	ODCSOPS

- **Magnitude and Pace of Quick Reaction Analyses (QRA).** The number of CAA QRA performed by month within each general area of analysis are shown at Figure 2-1. The total number of distinct analytical excursions CAA performed

in accomplishing these 84 QRA are shown by area and category at Figure 2-2. The high volume of QRA analytical excursions is indicative of the rapid pace of analysis support.

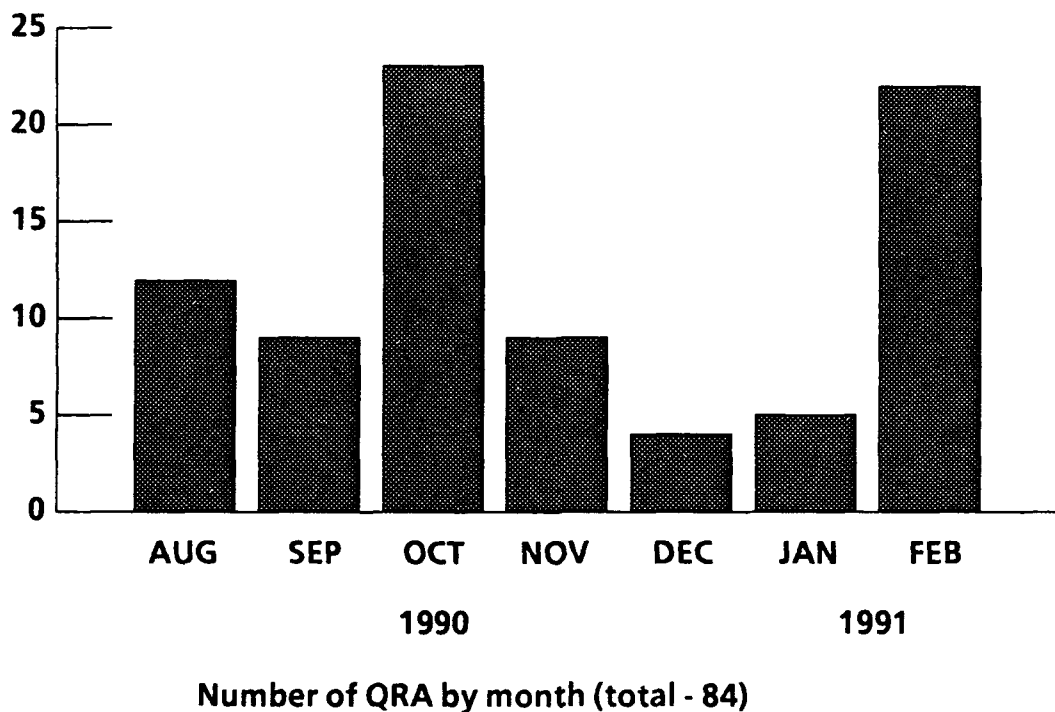


Figure 2-1. Magnitude and Pace of CAA QRA Support to Persian Gulf Crisis

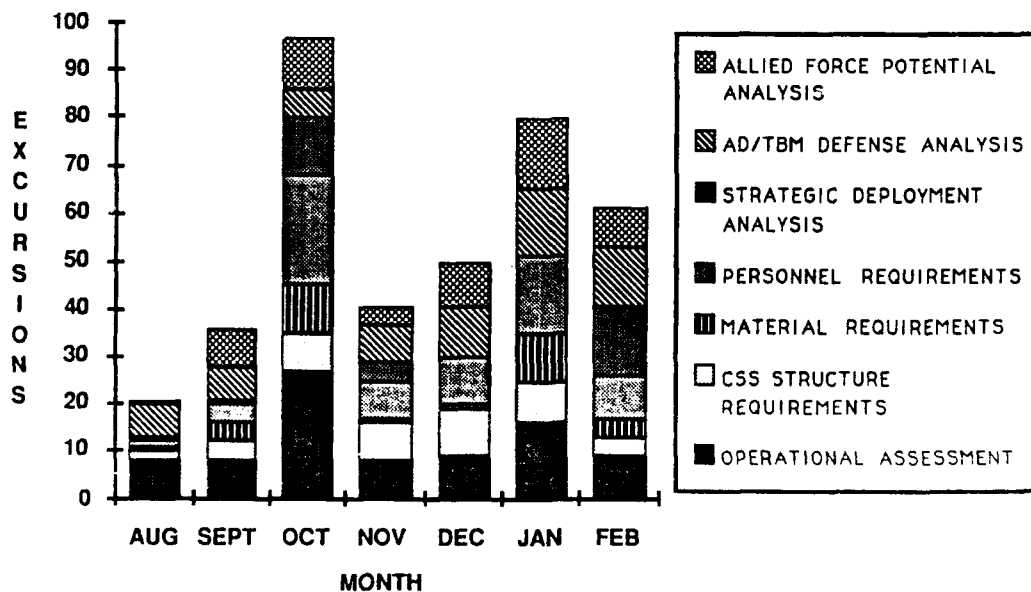


Figure 2-2. Number of Analytical Excursions Performed in Accomplishing QRA Support to Persian Gulf Crisis

- **Examples of CAA QRA Support to Persian Gulf Crisis.**

**Support Requirements Issues.** CAA developed a series of estimates of requirements for munitions and major items of equipment (MIE) in support of different campaign analyses. The variations considered allied strength alternatives as well as different employment schemes. In each case, a detailed estimate of equipment requirements and munitions necessary to support the alternative were computed. In addition, sensitivity analyses were performed to assess the impact of varying equipment replacement policies. Each set of data was passed to the Army Staff in a timely manner and were used in establishing requirements and in determining equipment and munitions shipping priorities. Similar analyses were done to estimate combat service support structure requirements and personnel replacement requirements.

**Air Defense Issues.**

**Saudi Arabia.** A number of quick reaction analyses were executed to assist in the decisionmaking process. These issues included estimating the number of air defense units required to provide an adequate defense against both a mass air raid and a tactical ballistic missile attack. These analyses reviewed the doctrine and evaluated the appropriate disposition and location of fire units to provide the best utilization and coverage for the specified critical areas (troop concentrations, logistics operations centers, headquarters, airfields, etc).

**Israel.** This analysis examined the capability of PATRIOT missiles to defend the major population centers against SCUD missile attacks, and assisted in determining the proper location of firing batteries to provide maximum coverage.

**Air Defense Sustainability Requirements.** Two analyses were accomplished to estimate the requirement for PATRIOT and STINGER missiles, given varying lengths for the Southwest Asia (SWA) conflict. Primary concerns were about adequacy and location of stocks.

● **Strategy Analysis and Formulation.**

- **Army Strategic Force Architecture (ARSTAR).**

The War Plans Division of the Office of the Deputy Chief of Staff for Operations and Plans commissioned the ARSTAR Study in August 1990. The study's objective was to fill the void in force structure planning which resulted from the disintegration of the Warsaw Pact and the decreased Soviet threat. The ARSTAR process resulting from the study has emerged as the Army's force planning paradigm in the post-Cold War era. The key features of the ARSTAR construct are its regional orientation, multidimensional approach, integration mechanism, and the transparent nature of the methodology used in producing results. Its regional orientation recognizes the decline in the dominant European case while considering evolving risks and challenges in other regions of the world. The multidimensional aspect aims to reduce uncertainty by taking several approaches to the problem which may expose aspects of force planning that any single approach may miss. The integration mechanism resolves or reports on competing implications while orienting on

cohesive output. ARSTAR's transparent methodology exposes key decision making variables and assumptions while evaluating a range of outcomes paralleling varying risks and objectives.

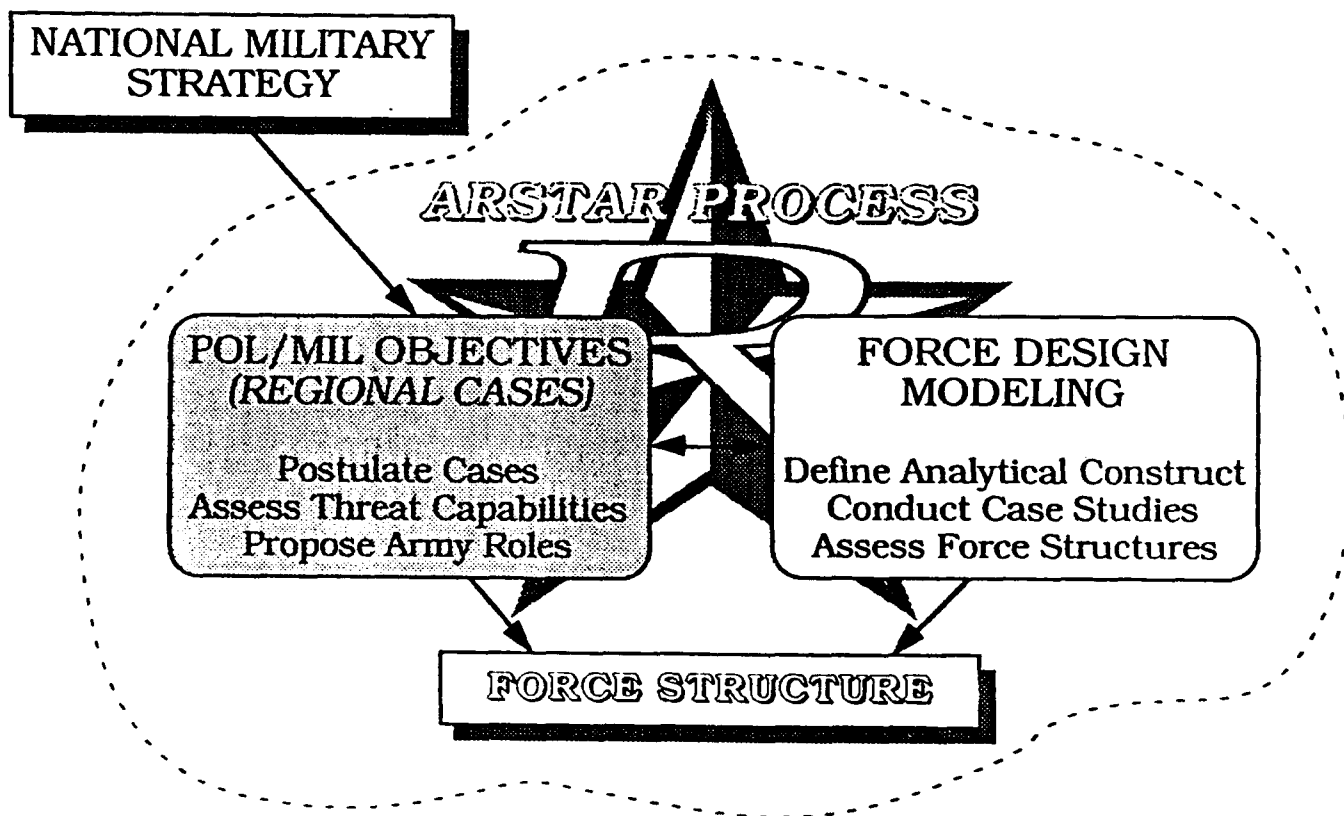


Figure 2-3. ARSTAR - A Road Map for Army Strategic Planning

The ARSTAR process can be separated into four distinct phases of inquiry (Figure 2-3). Phase I requires that the National Military Strategy (NMS) be understood in detail so that it can shape and guide the ARSTAR process. Next, political-military analysis of potential crisis areas by geographic region must be undertaken. During this phase, cases are formulated based on the prospective response from the United States and the appropriate level of that response on the force employment spectrum. Where appropriate, a dominant regional planning case is identified. Next, the force design modeling phase examines the regional planning cases using both static and dynamic analyses to assess force requirements associated with varying strategic objectives. The assessments for each case are then synthesized into a recommended force for each objective considered. The results of the force design modeling phase are then integrated using the priorities and objectives of NMS in the force structure synthesis phase. In addition, "functional blocks" which are not directly related to divisional structure,

such as table of distribution and allowance (TDA) units, and "collateral requirements" such as forward deployed units, are also estimated so that Army structure is complete.

**- Wargaming/Political-Military Gaming, Scenario, and Alternative Strategy Development.**

CAA conducted extensive wargaming analyses in support of DESERT SHIELD/STORM. These experiences were proactive efforts which facilitated more detailed follow-on analysis. The TIGER 90 series of man-in-the-loop wargames using the Contingency Force Analysis Wargame (CFAW) Model supported the Army's senior leadership during the initial defense of Saudi Arabia. Quick reaction contingency analyses were provided directly to the Army Operations Center, ARCENT Rear and Headquarters, FORSCOM at Fort McPherson, and ARCENT in Saudi Arabia. Specific elements of analysis supported force deployment and force structure decisions, and evolving concepts of operations to support the general campaign. Beginning in October 1990, these insights were used to support Operation DESERT STORM analyses employing higher resolution models such as CEM.

The events in Europe and the Gulf War clearly changed the national military strategy to a more global, multiregional focus. CAA's Conflict Analysis Center anticipated the evolution of political-military gaming as a critical analytical tool and initiated a series of regional conflict analyses using dynamic, interactive political-military gaming. In FY 91, the Conflict Analysis Center refined the political-military gaming methodology in coordination with the Army Staff and CINCs to assist their policy formulation and decisionmaking.

Interactive political-military games and their associated future estimates of geopolitical environments are flexible and diverse in depth and range of issues addressed. The strength of this methodology lies in presenting immediate feedback to the game sponsor. The Future Army Forces Pacific (FUPAC) analyses identified future scenarios and roles of the Army in the Pacific. Follow-on games PIL SONG I and II, TAE KWON DO 90, MORNING CALM 90, and HORIZON 91 analyzed Korean peninsula specific scenarios and issues. MAGELLAN 91 had a global orientation with emphasis on the Europe, Pacific, and Southwest Asia regions. BALBOA 91 analyzed options for peacetime engagement in Panama. TARO 91 looked at a likely mid-range course for the Pacific powers and the Army's future role in the greater Pacific Rim region. TARO 91 also initiated the Army Global Strategic Force Planning series. Political-military games proved their utility in addressing issues in the unconventional domain. The Counter-drug: Mandate for the Army (CMA) and Low Intensity Conflict Analysis Workshop (LICAWS) efforts were the first steps in a serious analytic campaign aimed at low intensity conflict (LIC). These games benefited directly from the participation of recently retired senior decisionmakers whose views enhanced results. CAC continues to refine LIC issues and methods to analyze them and to coordinate integration of Army-Air Force Center for Low Intensity Conflict (CLIC) studies into the analysis effort.

This analytical methodology provides valuable insights to the senior Army leadership and Army components of Unified Commands as they formulate

plans and make decisions in a global environment fraught with increasing levels of uncertainty. As an established and solid dimension of CAA's analytical framework, political-military gaming supports production of more sophisticated and comprehensive analysis critical to defense problem solving and decisionmaking. A paper highlighting these advantages was presented at the US/ROK Defense Analysis Seminar VI in Seoul. Currently, CAC is developing synergistic gaming, which combines the analytical advantages of political-military gaming and man-in-the-loop wargaming.

In FY 91, CAA and the US Army War College (USAWC) expanded their analytical and technical support exchange program. In the rapidly changing international security environment, CAA has increased its emphasis on strategic analysis, and has strengthened its capability to assess strategic concepts and broad military options by integrating strategic appraisals, political-military gaming, and quantitative analyses. Strategic requirements provide the context and framework for CAA's force analysis efforts. Sharing common data bases, models, scenarios, lessons learned, and study efforts has provided mutually advantageous benefits to CAA and USAWC through resource utilization efficiencies and synergistic improvements in analytical capabilities.

- Congressionally Mandated Mobility Study/Mobility Requirements Study (CMMS/MRS). CMMS/MRS provided movement requirement data bases for the Army's FY 99 POM force to support the Mobility Requirements Study (MRS) being conducted by the Joint Chiefs of Staff and the Office of the Secretary of Defense. MRS provides Congress with an updated review and analysis of alternative strategic mobility programs to satisfy requirements of US strategy in the 1990s and into the 21st century. The data bases addressed scenarios for five Major Regional Conflicts-East, three Major Regional Conflicts-West, two Lesser Regional Conflicts (2,000 and 6,000 miles from CONUS), NATO, and a Military Assistance Counterinsurgency operation. All data bases were provided to the Army Staff for review and input to the JCS deployment model.

- **Force Requirements.**

- Force Planning Support to ARSTAR.

The ARSTAR study effort relied on a host of independent assessments of specific Army force requirements. Four of these Agency assessments were the Global Force Allocation Model (GLOFAM), the Special Operations Forces Requirements Study (SOFRS), the Total Army Force Evolution Study II (TAFES-II), and the Post-CFE Posture Assessment (CPOST, discussed in paragraph 2-3).

GLOFAM is a linear programming model, developed to provide a rapid objective assessment of force structure requirements against a postulated threat. The model estimates the force structure required (in brigade equivalents) to meet a given target objective ratio against the threat. The model considers a host of policy and other considerations to include lift, forward deployment, modernization levels and prepositioning of materiel configured to unit sets (POMCUS) stocks. The model can quickly estimate force structure requirements and serve as a desktop force planner.

The SOFRS Study assessed the force structure requirements of Army Special Operations Forces (SOF). The assessment was based on designated mission lists and associated requirements for SOF provided by each CINC. The study used the Special Operations Forces Algebraic Requirements Model (SOFARM) to estimate the overall requirement for Special Operations battalions, groups, and aviation units.

The TAFES-II study assessed the requirement for United States and NATO force structure in Europe in the 1999 period. TAFES-II used theater simulation of an AFCENT campaign to estimate the force structure requirements for an adequate defense in Europe. The study estimated requirements over a wide array of possible threats due to uncertainty in Eastern Europe. The War Plans Division of DCSOPS relied heavily on this study and its assessment of future force requirements.

- **Total Army Analysis - 99 (TAA-99).** The results of CAA's quantitative analysis of Army support requirements (SRA-99) were briefed to the Chief of Staff of the Army on 13 Sep 91. The dominant issue in this year's analysis effort was the downsizing of the Army force structure. A major procedural (force structure) change resulted from the decision to pool combat support (CS) and combat service support (CSS) forces to increase the flexibility of planners when developing reduced force packages.

- **Combat Analysis Sustainability Model Validation (CASMO VAL).**

CASMO is a stochastic, event-step simulation model representing the operation of maintenance and logistic support within Army divisions. It is designed to assess the capability of logistics organizations to maintain and repair weapon systems, reorder spare parts, and perform other maintenance and logistics support functions under a variety of operational environments.

The CASMO VAL Study was nearing completion at the end of FY 91. This effort, which is jointly sponsored by the Operational Test and Experimentation Command (OPTEC) and CAA, built a base case data base for M1A1 Abrams tanks, verified the model logic, methodology, and model functions of the main model, and validated the model via operational tests and evaluations. The study objectives were to build a base case data base, verify the model, evaluate output, and conduct sensitivity analysis. Building the data base involved collecting and processing Force Evaluation Model (FORCEM) output, Sustainability Prediction for Army Spare Component Requirements for Combat Program (SPARC) hotline data, and logistics data. The logistics data included Field Exercise Data Collection (FEDC), Sample Data Collection (SDC) and Logistics Support Analysis Record (LSAR). The model verification/validation process, initiated along with reviewing model design and specifications, was followed by verifying and validating data structure, input processing, methodology, model logic, algorithm, model functions, and output processing. Model operational tests were performed and output data evaluated for reasonableness, usefulness, and correction of discrepancies. Debugging and modifications were done to correct discrepancies.



## ● Force Sustainability

- **Strategic Deployment Analysis Review Study (STRADER).** The DESERT SHIELD deployment provided CAA the opportunity to review and compare actual deployment data with simulation model deployment estimates; to test scenario assumptions, planning factors, and CAA's Transportation Model (TRANSMO); and to conduct a statistical evaluation of deployment results. The study examined the impact of strategic deployment planning factors and scenario assumptions used in Army deployment analyses as compared to those of Operation DESERT SHIELD. The study improved the validity and accuracy of the Concepts Analysis Agency's deployment analysis process by review and refinement of critical components of this process based on a comparison with actual deployment results.

- **Evaluation of POMCUS Program Issues.** The Agency has responded to increasing interest by our sponsors in issues which impact on the management of the POMCUS program. The thrust of this interest has been in both the evaluation of POMCUS management options and in the development of appropriate decision support methodology.

- **The POMCUS Unit Siting Alternatives (POMCUSITE) Study** was initiated to develop methods to assist the user in POMCUS program management. The POMCUSITE methodology permits the action officer to redistribute POMCUS assets to higher priority units, develop alternative siting plans for reconfigured (due to equipment redistribution) units, and generate intersite equipment transfer lists to implement the redistribution decisions and the resultant modifications to siting plans. The study provided the USAREUR sponsor with redistribution plans which will improve unit equipment fill, proposed siting plans which decrease the average storage site to unit assembly area distance, and equipment transfer lists which reduce the amount of equipment required to be moved to accomplish the improved unit siting.

- **The Floating POMCUS (FLOATPOM) quick reaction analysis** determined the number of each generic ship type required to store and/or transfer the equipment comprising each of the POMCUS packages. Computations were made both for fully authorized equipment levels and for levels restricted to the equipment onhand at European storage sites. These results could be used by the action officer to evaluate policy alternatives about potential shipboard storage of POMCUS equipment, or to determine ship requirements to implement the transfer of assets to Southwest Asia for potential employment in Operation DESERT STORM.

## **2-2. SUPPORT TO PLANNING AND INTEGRATION.**

### **● Operational Planning and Requirements**

**Commander, Eighth US Army (Korea).** Several CAA analyses were performed to assist in assessment of potential deficiencies and in developing plans to strengthen the defense of South Korea.

**The Regional Assessment of Combat Capability - Korea (RACCK).** The RACCK Study was requested to assess the capability of US and ROK forces to mobilize, deploy, fight, and sustain on the Korean peninsula in the execution of the current operation plan (OPLAN). This study was completed and briefed to the CINC and his staff in early 1991. The analysis examined some of the assumptions and planning factors implicit in the OPLAN and assessed the implications of those assumptions.

- **Regional Assessment of Combat Capabilities - Korea, Deployment Analysis (RACCK-DA).** RACCK-DA examined the capability of US to deploy units, ammunition, and other resupply to Korea in both a conventional and chemical environment in FY 91. The basic approach followed was to use the CAA strategic deployment simulation, TRANSMO, as an analytical tool for the measurement and assessment of strategic deployment capability. These results provide unit closure profiles to campaign simulation models that provide insights to the adequacy of forces assigned in a regional war scenario.

**Korean Operation Plan (KOPLAN).** After reviewing the results of the RACCK Study, CAA was asked to examine some alternatives to the current OPLAN which would improve the CFC's ability to execute its mission. This request initiated the KOPLAN Study, which looked at alternative operational concepts for both Red and Blue forces and recommended changes to the plan. Based on the results of this study, the CINC asked CAA to develop a briefing for him to present to the Chairman of the JCS and the service chiefs. This briefing led to approval to modify the current OPLAN. Since documentation of this effort has not been completed, it does not appear in Chapter 3 of this report.

- **Korean War Plans-Deployment Analysis (KOWAP-DA).** KOWAP-DA examined options for future war plan contingencies in the Republic of Korea. Options considered included three different corps packages to respond to this contingency theater. KOWAP-DA analysis focused on the arrival profiles which could be anticipated from each of these corps package options. The closure dates provided input to the campaign simulations with the CEM model. Emphasis was placed on ensuring full utilization of the lift with no constraints as to availability of the unit for movement other than the availability dates at the port of embarkation (POE).

**Follow-on Analyses.** CAA followed up RACCK and KOPLAN with a series of three quick reaction analyses to further assist the CINC in his planning for the defense of South Korea. These efforts have carried over into FY 92 and will be discussed in next year's Annual Report. These analyses examined still other alternative operational concepts, the implications of the timing of deployment of US forces to Korea, and the impact of several modernization options for the Republic of Korea armed forces.

## **2-3. SUPPORT TO SPECIAL PROGRAMS.**

### **● After Action Report for Operations DESERT SHIELD and DESERT STORM.**

On 11 February 1991, HQDA tasked CAA to assemble a study team to develop an After Action Report of Headquarters, Department of the Army's mission performance in support of Operations DESERT SHIELD and STORM. This study was subsequently undertaken by a select team of recently retired Army officers assembled by CAA based on their areas of individual expertise.

The *DESERT SHIELD/DESERT STORM After Action Report*, which is contained in three volumes, documents the findings and recommendations of the study team. This study effort undertook a careful examination of the Army's mission performance and issues resulting from Army operations in support of Operations DESERT SHIELD and STORM (August 1990 - August 1991) in Saudi Arabia, Kuwait, and Iraq. In preparing its report, the study team compiled and analyzed a collection of over 1,000 lessons learned reports, 21 individual HQDA After Action Reports, and a variety of other relevant documents, and conducted numerous interviews with HQDA staff officers involved with the operations.

A summary of the *DESERT SHIELD/DESERT STORM After Action Report* is included at Appendix B.

### **● Arms Control.**

#### **- Arms Control and Treaty Analysis.**

Agency research associated with conventional arms control culminated in FY 91 with three new assessments which influenced Army positions on the Conventional Armed Forces in Europe (CFE) Treaty. These assessments included the Nonnegotiated Reduction Risk Assessment - 1990 (NRISK-90), the CFE Circumvention Risk Assessment (CRISK), and the Post-CFE Posture Assessment (CPOST). This work built upon previous Agency research going back at least 3 years. As the work evolved and began to consider treaty monitoring and verification, the challenge of helping to define a militarily significant criterion for compliance judgments became a dominant objective. A November 1989 QRA, Military Risk Assessment (MILRISK), used theater simulations to examine specific Soviet strategies breaching CFE limits to achieve military significance. Military significance was defined as decisive deterioration in simulated outcomes, measured by factors such as territory lost, sustainment of combat resources, and casualties.

In November 1990, the NRISK assessment reexamined postulated monitoring and verification thresholds to incorporate updated scenario assumptions, projected structure and NATO force levels. The experimental design included a review of all the specific cases of "cheating" represented in the original November 1989 assessment.

In February 1991, the CRISK assessment addressed emerging concerns on Soviet circumvention. This analysis focused on evolving Soviet force restructuring forecasts and particularly on the force generation potential of large scale pre-CFE Soviet redeployments of weapon systems from the Atlantic to the Urals (ATTU) region. This reorientation, from *cheating* to *circumvention*, represented a key conceptual shift from the original assessment. The distinction is crucial, since cheating is *illegal*, while circumvention is *not*. This distinction defines the set of assumptions which drove the assessment's scenario development.

In July 1991, the C-POST assessment culminated Agency efforts addressing the CFE treaty. C-POST provided a final independent Army assessment of the post-CFE European security environment. Once again the focus was on risks of Soviet circumvention of the treaty as opposed to cheating. A wide variety of mobilization, force generation, and scenario variants were examined to address significant areas of concern. The assessment's conclusion influenced the final Army and Joint position on the Treaty. FOOTNOTE: A paper based on C-POST was a Barchi Prize candidate at the 59th Military Operations Research Symposium.

- **Support to Developing the Army Program Objective Memorandum (POM).**

The Value Added Analysis Phase I Study developed and demonstrated a methodology to assist Headquarters, Department of the Army decisionmakers in evaluating and prioritizing competing Army Program Objective Memorandum (POM) alternatives (Figure 2-4). The study developed a concept which uses a family of logically integrated models to measure an investment alternative's relative value. The Value Added Analysis Methodology allows decisionmakers the opportunity to use this relative value directly or to use the results of a mathematical optimization model which produces a feasible, affordable investment strategy.

The Value Added Analysis (VAA) Phase II Study was an outgrowth of the Phase I Study and is intended to implement the concepts developed during Phase I. This study, although started in fiscal year 1991, will be completed late in fiscal year 1992. The Phase II Study will result in a fully integrated decision assistance capability residing on the METAPHOR computer architecture both at CAA and ODCSOPS. Furthermore, as part of the Phase II Study, CAA will provide analytical support to the 1994-1999 POM development as part of the implementation process.

**VAA Process - Assesses relative contributions of systems to force combat effectiveness**



**Analysis of system cost versus battlefield performance**

**Army POM**

**Long-Range Army Materiel Plan**

**Balanced procurement program based on analysis of combat effectiveness versus cost**

**A Decision Support System for Materiel Systems During POM Development**

**Figure 2-4. Value Added Analysis - A Decision Support Capability for POM Development**

- **Management of Army Major Item Systems.**

The purpose of the Army Resource Integration and Management (ARIM) Study was to develop and demonstrate a practical and affordable methodology to enable ODCSOPS to integrate and manage resources on an Army Major Item System (AMIS) basis. ARIM recommended that nine frequently used codes be consistently used to define the personnel, materiel, and facility requirements for all AMIS. The study also recommended the storage of system definitions, when approved by the Assistant Deputy Chief of Staff for Operations and Plans, Force Development, in a centralized data base such as the ODCSOPS METAPHOR Computer. A prototype of the ARIM methodology was developed on the METAPHOR computer. It demonstrated how comprehensive definitions of AMIS with codes can facilitate the efficient retrieval and manipulation of programmed resource data. Data is retrieved by management decision packages (MDEPs) from authoritative Army data bases such as the Program Optimization and Budget Evaluation (PROBE) and the Long Range Research, Development, and Acquisition Plan.

### ● Army TDA Cost Reduction Initiatives.

This analysis effort was undertaken to develop a methodology for the Project VANGUARD staff for evaluating cost reduction initiatives in the tables of distribution and allowance (TDA) by considering their impact on Army missions. A pairwise comparison of derived Army missions was used so that measures of relative importance would be assigned to each mission. All initiatives that were defined by VANGUARD were then assigned to the appropriate major commands and evaluated by their responsible VANGUARD functional area teams. The derived values from these two steps provided a basis for rank ordering the VANGUARD initiatives in terms of their potential mission impacts and cost savings.

### ● Support for Federal and State Missions.

The Army Support Options Study (ASOS) developed and demonstrated a framework that systematically relates US domestic problem areas to Federal and state missions and, in turn, to Army nonwarfighting missions and capabilities. The framework was implemented and made operational using an automated relational data base management system. Within this framework, particular Army initiatives can be formulated that could potentially support Federal and state missions aimed at solving and reducing major problems in the US. Since the documentation for this effort has not been completed, it does not appear in Chapter 3 of this report.

### ● Modernization Planning Analysis.

The primary applications of these efforts, in support of ODCSOPS, were to develop and analyze aviation, command and control, and tactical wheeled vehicle modernization strategy alternatives, in order to determine the quantities of systems that should be procured, service life extended, maintained, and retired to meet force structure and modernization requirements. Additional research and analysis in this area included the enhancement and upgrading of the Force Modernization Analyzer (FOMOA) Model to more closely meet ODCSOPS' analytical requirements.

The Cost Analysis Team at CAA performed extensive economic analyses, weapon system costing, and force costing for numerous key studies such as Value Added, Army Resource Integration and Management (ARIM), and Strategic Mobility Alternatives (SMA). In support of these studies, mathematical models were developed to determine detailed life cycle costs of weapon and support systems and to measure the impact of economies of scale on production costs. Combining automation with data architecture principles, cost analysis support at CAA has developed into a highly versatile, responsive capability.

## 2-4. ANALYTICAL RESEARCH AND DEVELOPMENT.

- **Global Deployment Analysis System - Transportation Model (GDAS-TM).** CAA is currently developing, through contract support, a Global Deployment Analysis System (GDAS). GDAS represents the first stage of an entire ADP system which will evaluate the capabilities and requirements of the mobilization and deployment system of the Department of Defense and provide input to CAA combat models. GDAS-TM focuses on completion of a fully functional transportation model. Contractor deliverables are structured as five successive module installations to provide expanded opportunity for CAA testing and scheduled corrections/changes within the scope of the contract. The impact of GDAS-TM completion will permit more realistic simulation of strategic deployment, more detailed sensitivity analysis, suitability for a broader ranges of studies, increased capability to understand/explain results, and faster study turnaround.

- **Airlift Requirements.** The Airlift Force Study (ALF-1) was a quick reaction analysis done during FY 91 by CAA for the US Air Force. The purpose of this effort was to develop a new measure of effectiveness (MOE) for airlift to replace the old one (million ton miles). A proposed MOE was developed for the theater of interest that relates airlift capacity to battle outcome.

- **Next Generation Wargame (NXG).** CAA awarded a contract in FY 91 for development of a flexible interactive wargame that can reasonably portray joint and combined conflict anywhere in the world with a minimum of setup time, data resources, and players to replace the current Contingency Force Analysis Wargame (CFAW). The NXG Wargame is to be developed as a system comprised of three principal parts: (1) a preprocessor to prepare and analyze input data in the proper format; (2) a model to process the data, and; (3) a postprocessor to provide data output reports and analysis. The system's design will permit the wargaming of combat from battalion-level to theater-level conflict with the potential of expansion into low intensity conflict.

- **Osipov Translation.** In 1915, a Russian named M. Osipov published a series of five articles which appeared in the Russian journal *Military Collection* under the title, *The Influence of the Numerical Strength of Opposed Forces on Their Casualties*. These articles represent outstanding contributions to the development and application of scientific methods to the analysis of combat and are of great historical interest and worthy of emulation today. Since the significance of M. Osipov's work is little known in the west, CAA undertook a research effort to translate and evaluate his work and make it readily accessible to military analysts in the Western World. A summary of M. Osipov's work is included at Appendix C.

## **2-5. INTERNATIONAL MILITARY OPERATIONS RESEARCH ACTIVITIES, FOREIGN VISITORS, AND CONFERENCES AND PROFESSIONAL SOCIETIES.**

● **General.** CAA engages in a host of activities involving the national and international exchange of professional information and techniques; the professional development of analysts; the promotion of research and development efforts in the field of military OR; and the application of advanced technologies. Collectively, these efforts help maintain the expertise and essential analytical perspective important for understanding and analyzing current issues. The most notable of these activities are listed below.

### ● **International Military Operations Research Activities.**

- **The 6th ROK/US Defense Analysis Seminar (DAS VI)**, 9-13 Sep 91. CAA participants in the DAS VI held at the Korea Institute for Defense Analysis (KIDA) in Seoul, Korea, were Mr. E. B. Vandiver III, COL Arthur E. Parker III, and Mr. Howard G. Whitley III. DAS VI activities focused on defense planning, resources, methodologies, and scenarios.

- **The Quadripartite Working Group on Army Operations Research (QWG/AOR)**, 6-12 Feb 91 at MOD Headquarters, Ottawa, Canada. CAA's representative to the 19th meeting of the QWG/AOR was Mr. Howard G. Whitley III.

- **The Information Exchange Group on Historical Data Analysis of QWG/AOR.** Mr. Howard G. Whitley III (CAA) served as the Chairman of this Group involved in exchanging information among four countries.

- **The US/French Data Exchange Agreement.** Mr. Howard G. Whitley III (CAA) served as the Assistant Technical Project Officer for this effort which involved exchanging information and planning for cooperative projects to improve simulation and analysis capabilities.

- **The NATO Arms Control Analysts' Group.** LTC Dorn Crawford participated as CAA's representative at semiannual meetings of analysts from NATO member countries addressing conventional arms control issues.

- **The European Conflict Analysis Program.** LTC Dorn Crawford participated as CAA's representative in this US-German bilateral forum on European security issues involving various government and private research agencies.

### ● **Foreign Visitors and Dignitaries.**

#### **Australia:**

Mr. Ralph W. Hole  
LTC Ian L. Cleaver  
Mr. Brian E. Furby

Analytical Studies Group, Australian Army  
Australian Army Staff  
Head, Combat Systems Technology, Combat  
Systems Division, Defense Science and Tech-  
nology Organization, Australia  
Head, Combat Systems Effectiveness, Combat  
Systems Division, Defense Science and Tech-  
nology Organization, Australia

Mr. Maxwell L. Possingham



**Canada:**

Dr. Sidney W. Witiuk	Chief, Operational Research and Analysis Establishment, Department of National Defense, Canada
Mr. Peter R. Anderson	Director General Operational Research, Operational Research and Analysis Establishment, Canada
Dr. Christoher Helleur	Operational Research and Analysis Establishment, Canada

**Federal Republic of Germany:**

COL Joachim Bauers	Army Staff, Federal Republic of Germany
LTC Gerald Lau	
Dr. Thomas Otto	

**Israel:**

BG (Ret) Avraham Ayalon	Assistant for Analysis and Research, Training and Doctrine Office, Israeli Defense Force, Israel
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**Korea:**

BG Taek Park Chun	ROK Air Force, ROK/US Combined Forces Command
Dr. Chung-Ung Lee	Director, Force Development, Korea Institute for Defense Analysis, Korea
BG Yongng Hyo Kwon	Director, Department of Systems Analysis and Computer Management, Planning and Management Directorate, ROK Army
LTC Jin Seob Cha	Department of Systems Analysis and Computer Management, Planning and Management Directorate, ROK Army
Dr. Kiduck Chang	Director, Resource Management, Korea Institute for Defense Analyses
MAJ Gun Kim	Korean Embassy

**Netherlands/NATO:**

Dr. L. Ronald Speight	Chief, Operations Research Division, SHAPE Technical Centre, The Hague, The Netherlands
Mr. Rex Goad	SHAPE Technical Centre, The Hague, The Netherlands
Mr. Gavin Lauderdale	SHAPE Technical Centre, The Hague, The Netherlands

### **Pakistan:**

MG Syed Tanwir Hussain  
Naqvi  
COL Bashir Khan Haroon  
LTC Parvez Akmal  
LTC Muhammad Akbar

Commandant, Command and Staff College,  
Pakistani Army  
Military Attache, Pakistani Army  
Instructor, Pakistani Command and Staff College  
Instructor, Pakistani Command and Staff College

### **Spain:**

CMDR Francisco Moreno  
Rodriguez

Assistant Defense Cooperation Attache, Embassy  
of Spain

### **Sweden:**

BG Per-Arne Ringh  
Mr. Tore Sverker Isacson  
Mr. Rune Stefan Larsson  
MAJ Jan-Inge Svensson

Defense and Military Attache, Embassy of Sweden  
National Defense Research Establishment, Sweden  
Army Staff, Sweden  
Army Staff, Sweden

### **UK:**

Dr. Paul H. Collins  
Mr. Steve E. Gibbs  
Mr. John Shrimplin  
Dr. David Leadbeater  
Mr. Stephen McCarthy  
Mr. Gavin Litterdale  
Mr. Charles Dixon  
Mr. James Platt  
Mr. Geoffrey P. Hawkins Jr.  
Mr. George Rose  
Dr. Allen Brignail

Assistant Director, Science (Land), Ministry of  
Defense, UK  
Director, Science (Land), Ministry of Defense,  
UK  
Director, Science (Studies), Ministry of  
Defense, UK  
Director, Defense Operational Analysis Estab-  
lishment, UK  
Head of Net Assessments Unit, MOD, UK  
Defense Operational Analysis Establishment, UK  
Royal Armaments Research and Developments  
Establishment, UK  
Attache, Defense Equipment (Land), Embassy of  
the UK  
Defense Operational Analysis Establishment, UK  
Defense Operational Analysis Establishment, UK  
Defense Operational Analysis Establishment, UK

### **USSR:**

Prof D. Vitali N. Tsygichko

Institute for Systems Studies, USSR  
Academy of Sciences

● **Conferences and Professional Societies.**

- **AORS XXIX.** Army AORS XXIX which was scheduled for 10-11 Oct 90 at Ft. Lee, VA was canceled due to Operation Desert Shield. The following CAA papers had been nominated for presentation:

TOPIC	PRESENTER
The Study Director's Advisor	LTC H. M. Ryan, III
Analysis of Southwest Asia Ports:	MAJ R. Albrecht
A Simulation of Marine Terminal	
Fixed Port and LOTS Operations	CPT R. VanGrow
Spreadsheets, Optimization and FOMOA	Dr. R. Schwabauer/Mr. E. Nedimala
Concurrent Theater Level Simulation	Mr. J. Shepherd
Value Added Analysis	Mr. S. Siegel/LTC J. Richmann

- **AORS XXX.** The following CAA papers were selected for presentation at AORS XXX scheduled for 12-14 Nov 91 at Ft. Lee, VA:

TOPIC	PRESENTER
GLOFAM	Mr. D. Schilling/Mr. L. Albert
STRADER	CPT E. Vance
Modeling of ALB/ALBF	CPT M. Kelly
Rates of Advance in Land	
Combat Operations	Dr. R. Helmbold
Stochastic CEM	Dr. R. Johnson/Mr. W. Allison
RAACK	COL J. Stull
Threat Radar Environment	CPT E. Isensee

- **59TH MORS.** The 59th Military Operations Research Symposium was held on 11-13 June 1991, at West Point, NY. At meeting of the Board of Directors, Mr. E. B. Vandiver III was elected Vice President for Professional Affairs, and LTC Dorn Crawford was elected to the Board of Directors and made Chairman of the PHALANX Committee. Six CAA-sponsored papers were presented, and nine CAA personnel attended this annual conference. CAA papers and presenters were:

TOPIC	PRESENTER
Analysis Support to Desert Storm	
Planning	Mr. E. B. Vandiver III
Concurrent Theater-level Simulation	Mr. John Shepherd
(CTLS) (two papers)	
Ardennes Campaign Simulation	Mr. Howard Whitley III
(ARCAS)	
NATO 2000	CPT Eric Stebbins
Strategic Deployment Review Study	CPT Elizabeth Vance
(STRADER)	
Conventional Stability Update	LTC Dorn Crawford

**NOTE:** LTC Dorn Crawford of CAA's Advanced Planning and Integration Office, attended the below listed meetings and conferences as CAA's representative.

- **International Studies Association.** Annual meeting of principal professional security studies organization.
- **American Political Science Association.** Annual meeting of principal professional political science organization. LTC Dorn Crawford of CAA presented a paper on evolving challenges of strategy formulation.
- **American Association for the Advancement of Science.** Colloquium on science and security involving range of government and private arms control/security policy players.
- **US Institute of Peace Conference on Conflict Resolution.** Presentations and panels on emerging challenges of regional stability and role of force.
- **Center for Naval Analysis (CNA) Sea Power Forum.** Insights and ideas presented by a range of policy analysts on naval and generalized security strategies.
- **National Defense University Topical Symposium on National Security.** Panels and plenary sessions on emerging issues of national security policy and practice.
- **Carnegie Endowment Arms Control Study Group.** Continuing sessions of group arms control actors and researchers studying new issues for assessment.
- **CNA Soviet Political/Military Affairs Seminars.** Periodic seminars by US and Soviet policy analysts on Soviet (and republics) and bilateral developments.
- **CSIS Conventional Arms Control Project.** Developmental project on ideas and initiatives for conventional arms control policy, underwritten by USD(A) contributing materials for published study report.
- **International Security Council.** Periodic seminars on security issues, including Gulf War, nonproliferation, and tactical nuclear roles and missions.
- **Washington World Affairs Council.** Occasional lectures and presentations by visiting scholars and government dignitaries on current policy issues.
- **Defense Academic Research Support Program.** Periodic roundtable discussions and seminars at Defense Intelligence College on intelligence community interests.

● CAA Management Planning Conferences.

7 November 1990. Key areas addressed during this conference were the effects of the Army's QUICKSILVER Manpower Study which reduced CAA civilian manpower levels by 18 civilian spaces and the potential impacts of Project VANGUARD recommendations upon CAA's organizational structure and staffing.

1 May 1991. Major areas addressed during this conference were alternative strategies for coping with FY 92 manpower and budget reductions, and planning the Agency's near-term future organization and activities.

**CHAPTER 3**  
**SUMMARIES OF ANALYTICAL EFFORTS**

Chapter 3 contains summaries of CAA analytical efforts  
completed during FY 91.

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## **FY 91 Studies and Contracts**

### **Anti-Armor Defense Data, Phase II (A2D2P2)**

The objective of this project was to collect data on at least 14 combat actions at Krinkelt-Rocherath during World War II involving US forces defending against German armored attacks and organize documentation and engagement statistics in forms to support research into degradation of effectiveness of anti-armor systems under combat conditions. The resulting degradation factors will allow projections of the combat performance of future anti-armor defenses to be based upon a balanced combination of historical and instrumented field test data. The contractor researched the archives and other potential sources of historical data on operations at Krinkelt-Rocherath, gathering detailed information on individual combat actions, and documented the results in the form of narrative accounts of 19 combat actions, including maps, force dispositions, and displacements as well as an automated database on details required for the follow-on analyses. Additionally, the contractor developed a "How to Research" guide describing the various activities carried out in the first two phases of this effort. The contracting organization was Science Applications International Corporation, and the primary investigator was Ms. Victoria Young. The POC for further information is Mr. Howard G. Whitley III, US Army Concepts Analysis Agency, DSN 295-1611.

### **Army Resource Integration and Management (ARIM)**

The purpose of the ARIM study was to develop and demonstrate a practical and affordable methodology to enable the Office of the Deputy Chief of Staff for Operations and Plans (ODCSOPS) to integrate and manage resources on an Army Major Item System (AMIS) basis. The Multiple Launch Rocket System was the AMIS that was used to develop and demonstrate the methodology. ARIM recommended that nine frequently-used codes be consistently used to define the personnel, materiel and facility requirements for all AMIS. The nine codes are military occupational specialty (MOS), major item system code (MIS-CD), standard study number (SSN), line item number (LIN), Department of Defense Ammunition Code (DODAC), national stock number (NSN), end item code (EIC), facility category code (CATCDE) and the facility DD 1391 Form number (FORMNO). The study also recommended that system definitions, when approved by the Assistant Deputy Chief of Staff for Operations and Plans, Force Development, be stored in a centralized data base such as the ODCSOPS METAPHOR Computer. A prototype of the ARIM methodology was developed on the METAPHOR Computer. It demonstrated how comprehensive definitions of AMIS with codes can facilitate the efficient retrieval and manipulation of programed resource data from authoritative Army data bases such as the Program Optimization and Budget Evaluation (PROBE) and the Long Range Research, Development, and Acquisition Plan. The POC for further information is Ms. Ola C. Berry, US Army Concepts Analysis Agency, DSN 295-1642.



### **Attrition Calibration Evaluation - Phase 1, Direct Fire (ATVAL)**

The ATVAL Phase 1 study, sponsored by the Director, Concepts Analysis Agency, is a comprehensive analysis of the application of the ATCAL model. The Study examines the capability of the Attrition Calibration algorithm to extrapolate for differences in force size, force ratio, force frontage and force composition. The analysis is based on campaign results obtained with the Combat Sample Generator (COSAGE) and the Concepts Evaluation Model VI (CEM VI). The POC for further information is Mr. Hugh Jones, US Army Concepts Analysis Agency, DSN 295-5251.

### **Chemical Protection Hazard Assessment in Europe (CHEMPHASE)**

The sponsor for the Chemical Protection Hazard Assessment in Europe (CHEMPHASE) Study is DAMO-SWC. The purpose of the CHEMPHASE study is to analyze the effects of penetrant chemical agents employed against NATO. The Chemical Casualty Assessment (CHEMCAS) model at the U.S. Army Nuclear and Chemical Agency (USANCA) provides the penetrant chemical agent effects. Five combat simulations are performed using the Force Evaluation Model (FORCEM) theater level model using a 1996 CFE force. The study results include the impact of penetrant agents on NATO personnel, combat capability, and logistics. The POC for further information is CPT John C. Roberts, US Army Concepts Analysis Agency, DSN 295-1262.

### **Counter-drug: Mandate for the Army (CMA)**

The CMA study, sponsored by ODCSOPS, HQDA, provides an objective assessment of possible counter-drug options that contribute to the development of Army policy and strategy supporting the national strategy. Surveys were sent to knowledgeable action officers, who were asked to provide comments, rank the impact of implementation of each option, and determine if each option should be implemented now, at a later time, or avoided. Interviews were then held with key senior officials. The major finding was to "Implement Now" 5 of the 16 options. These include ensuring that the USMA and all colleges offering ROTC programs are in the Network of Colleges and Universities Committed to the Elimination of Drug and Alcohol Abuse, expand liaison with drug law enforcement agencies and host nation forces, expand information sharing capabilities, expand training on the Intelligence Preparation of the Battlefield (IPB) and data correlation, and expose civilian leaders to successes of the Army drug program. The POC for further information is LTC Golding, US Army Concepts Analysis Agency, DSN 295-1708.

### **Desert Shield Strategic Lessons Learned (DSSLL)**

The DSSLL study, sponsored by Deputy Chief of Staff for Operations and Plans, for Force Development (DAMO-FD), documents the Headquarters, Department of the Army overview of actions taken during, and issues resulting from, Army operations in support of Operations Desert Shield and Desert Storm (August

1990 - August 1991) in Saudi Arabia, Kuwait, and Iraq. It was compiled and prepared by a team of retired officers selectively recalled to active duty at USACAA for specific areas of expertise applicable to this project (including two CAA alumni). The POC for further information is LTC Michael A. Burchett, US Army Concepts Analysis Agency, DSN 295-0211.

### **Accessions Forecasting for Dynamic Force Structures (DYNAFOR)**

The DYNAFOR study, sponsored by ODCSPER, HQDA, assesses the impact of two enlisted force drawdown scenarios on recruiting requirements and future force composition. The analysis considers the impact of variations in key accessions policy options, such as mental category profile, term of service composition, and high school graduate percentage. A separate, related study product is a personal computer-based decision support aid which will permit HQDA staff officers to conduct quick-turnaround assessments of alternative recruiting policies. The DYNAFOR methodology is based on a goal-seeking spreadsheet model which computes accessions required to achieve a given end strength ramp, then projects the quality and term of service composition of the out-year force. The DYNAFOR scope is limited to enlisted grades E-4 and below. Study findings include the observation that accessions quality mix has an immediate, significant, and generally predictable impact on the size and composition of the junior enlisted force. The POC for further information is Mr. George Peery, US Army Concepts Analysis Agency, DSN 295-1609.

### **Enhanced Massively Parallel Deployment Analysis (EMPDA)**

The Enhanced Massively Parallel Deployment Analysis Study (EMPDA) has provided the agency with a research tool for testing the use of a state of the art high speed computer for strategic scheduling exercises. By use of an internet connection, a CAA analyst may schedule available strategic lift assets against theater level lift requirements using a 64,000 node Connection Machine at the Army High Performance Research Computing facility at the University of Minnesota. While the scheduling algorithm employed does not produce execution quality schedule, the algorithm represents a first step in analyzing the search space of this multi-commodity, multi-vehicle transportation problem. The POC for further information is Mr. Chester Jakowski, US Army Concepts Analysis Agency, DSN 295-5233.

### **European Transportation Requirements for the Backhaul of Personnel/Cargo (ETRANS)**

The ETRANS study, sponsored by the Office of the Deputy Chief of Staff for Logistics, Headquarters, Department of the Army (HQDA) compares the retrograde (backhaul) requirements for two CAA studies focusing on the NATO Central Region. One Study is set in 1996 based on a NATO versus Warsaw Pact scenario. The other scenario is based in the post Conventional Forces Europe (CFE) environment. Passenger and cargo retrograde transportation mission

requirements are identified, estimated, and planned for movement using U.S. and host nation truck companies. Emphasis is placed on anticipated requirements for heavy equipment transporters. The POC for further information is MAJ J.P. Brown, US Army Concepts Analysis Agency, DSN 295-1137.

#### **FASTALS Automation Contract (FASTAUTO)**

The FASTAUTO contract was sponsored by the US Army Concepts Analysis Agency (CAA) and completed by Automation Management Consultant, Inc (AMCI) in May of 1991. The purpose of the contract was to develop menu-driven routines to update and maintain the input files for FASTALS, and execute the model on a Macintosh local area network (LAN). The menu driven utility routines enable each of the functional area analysts in the Support Forces Analysis Division to quickly update their areas of responsibility, run the model, and perform analysis on the resulting changes in the time phased troop deployment list. The POC for further information is Mr. Raymond McDowall, US Army Concepts Analysis Agency, DSN 295-5264.

#### **Force Employment Study (FES)**

The Force Employment Study, sponsored by the Deputy Director of Strategy, Plans and Policy, ODCSOPS HQDA, reviewed the force deployments of 50 or more soldiers from 1975 to 1990 (pre-Desert Shield). This review established an historical database to supplement the force determination process and aid in the design of future simulations and wargames. The basic approach was to gather information, automate the data and analyze the data. Major sources of data were the Center for Military History, FORSCOM, the Engineer Study Center and the National Guard Bureau. Study results showed that forces had been employed 22 times outside the continental United States (OCONUS) and 27 times within the continental United States (CONUS). Approximately 9.4 million man-days were used by the Active Army, National Guard and Army Reserve in support of all operations with OCONUS operations accounting for 77.4 percent of the man-days. Army National Guard and Army Reserve personnel accounted for 11 percent of the total man-days. Army National Guard and Army Reserve personnel accounted for 11 percent of the total man-days. The major consumers of OCONUS operations were peacekeeping operations (30 percent) and nation building and support (21.9 percent); the major CONUS consumer was refugee resettlement operations (15.1 percent). Infantry units, military police units and engineer units consumed over 65.3 percent of the total man-days. OCONUS operations were centered in Latin America (15 operations, 49 percent of the total man-days) and the Pacific (3 operations, 11.4 percent of the total man-days). Natural disasters were the major focus of CONUS operations accounting for 18 of the 27 CONUS operations; however, they only accounted for 4.8 percent of the total man-days. The POC for further information is MAJ Kern Wilson, US Army Concepts Analysis Agency, DSN 295-1612.

## **Information Mission Area Modernization Study (IMAM)**

The purpose for performing this study was to provide the Office of the Director of Information Systems for Command, Control, Communications, and Computers (ODISC4) a methodology for prioritizing proposed information mission area (IMA) investments. The scope of the study included all existing and envisioned hardware and software investments within the continental United States IMA sustaining base environment. Although a potentially useful mathematical model was developed, the information necessary to use it is incomplete and will require additional effort. Before standard management science tools can be used to assist ODISC4 decision making, the relationship between the demand for IMA resources and the work being accomplished by IMA customers must be understood. The POC for further information is Ms. Linda Coblentz, US Army Concepts Analysis Agency, DSN 295-0211.

## **Independent Verification and Validation of FORCEM Command and Control (Blue) (IV&V FC2)**

This was an Independent Verification and Validation of Blue force planning in the asymmetric Command and Control Effort (AC2E) model, a prototype of representations of separate command, control, and maneuver algorithms for Blue and Red forces. It evaluated the Blue force planning logic imbedded in the model. The internal CAA development project will result in software that will improve the representation of force maneuver and employment in CAA analyses. The effort included an examination of the model's source code, input data and associated outputs, and independently operating the model to investigate specific model features and sensitivities. The final contract report included an assessment of the AC2E model's capability, including the representation of the dynamics of the close (FLOT) battle and how synchronized use of reserve and main battle area forces in the close battle. Limitations noted include absence of fires, force protection, and sustainment features as well as the lack of consideration of deep operations. The contracting organization was Potomac Systems Engineering, Incorporated, and the primary investigator was Mr. Vernon H. Hamilton. The POC for further information is Mr. Howard G. Whitley III, US Army Concepts Analysis Agency, DSN 295-1611.

## **Independent Verification & Validation of The Global Deployment Analysis System, Phase II**

This contractor supported effort, a follow-on from the initial comparison of system technical requirements against capabilities outlined in design documents produced by the model developer, carried the independent review one step further by tracing the requirements through the actual implementation. Additionally, the contractor developed a test plan which would determine that the model performs as designed. The products, documented in formal reports, provide a basis for testing the model as delivered. The Potomac Systems Engineering project head was Mr. Vernon Hamilton. POC for further information is Mr. Howard G. Whitley III, US Army Concepts Analysis Agency, DSN 295-1611.

### **Initial Wartime Army Support-Effectiveness & Capability (IWAS-EC)**

There had been no method in the past to provide senior Army decision-makers with additional information and insights in force structure capabilities, critical support shortfalls, dependence upon non-organic support sources, and the effectiveness and progress of productivity enhancing systems and external support sources. Considerable combat support and combat service support (CS/CSS) offsets being provided by the Logistical Unit Productivity System (LUPS), the Logistics Civil Augmentation Program (LOGCAP), and civil and military Wartime Host Nation Support (WHNS) arrangements for support of current and future forces. The US Army has been unable to completely describe and quantify the total support requirements, which are resourced or are being planned for resourcing from LUPS, LOGCAP, and WHNS programs. This study effort provided a simple chart/graph to describe the change in force structure composition of non-divisional logistics capability and effectiveness through FY 94. Primary focus was on developing a methodology for representing logistics capability from various functional areas in a single composite graphic. The POC for further information is MAJ Barry Brassard, US Army Concepts Analysis Agency, DSN 295-5270.

### **Long Range Army Materiel Requirements Plan Study (LRAMRP)**

The purpose for performing the study was to add a theater context to certain modernization issues being examined by TRADOC Analysis Command (TRAC), as part of the Long Range Army Materiel Requirements Plan Study. The study sponsor was Commander, TRADOC Analysis Command, who established the study objective and monitored the study activity. The study objective was to answer TRAC specified modernization questions. The scope of the study was theater level, conventional warfare in a European environment. The basic approach used was to: (1) establish a base case involving US forces at current levels of modernization and threat forces at projected 2004 levels of modernization; (2) modernize US forces according to modernization options outlined by TRAC and; (3) explore other feasible modernization options that became apparent during the analysis. The principle findings of the work were: (1) AirLand Battle-Future (ALB-F) modernized forces perform better than current Army of Excellence (AOE) forces; (2) modernizing from M109A6 (HIP) to AFAS increases force performance; (3) employing an artillery delivered interdiction weapon system increases force performance. The POC for further information is MAJ David Knudson, U.S. Army Concepts Analysis Agency, DSN 295-1592.

### **Marine Terminal Evaluation Program (MARTEP)**

The Marine Terminal Evaluation Program (MARTEP) Study was a documentation effort to develop a user manual for the MARTEP PC based computer simulation developed for the Office of the Deputy Chief of Staff for Logistics (ODCSLOG). MARTEP is a simulation of the activities at a water terminal in a theater of operations. The simulation is capable of evaluating throughput operations for both fixed port and logistics over the shore (LOTS) operations. It models terminal reception, discharge and clearance operations

using an aggregated ship arrival schedule. MARTEP was initially developed to quantify Army tugboat requirements for Southwest Asia in the Analysis of Southwest Asia Port (ASWAP) Study. POC for further information is Major Robert G. Albrecht, Jr., U.S. Army Concepts Analysis Agency, DSN 295-1657.

#### **NATO 2000 Appendix (NATO 2000V)**

The NATO 2000 study, sponsored by the Deputy Chief of Staff for Operations and Plans (DCSOPS), was published in FY90. This report provided an estimate of NATO's future military, political and economic structure in the 1990s. Because the NATO 2000 study was based on interviews with American experts, the study sponsor requested that European experts be interviewed to see if their views were significantly different. The NATO 2000 appendix contains results from personal interviews with experts in Germany, Belgium, France, and the United Kingdom. This appendix is published within subsequent printings of the NATO 2000 report. The POC for further information is CPT Barry Bazemore, U.S. Army Concepts Analysis Agency, DSN 295-1679.

#### **Operational Readiness Study FY-91, FORCEM (OMNIBUS-91F)**

The purpose of OMNIBUS-91 FORCEM memorandum report was to document the results of the combat simulations conducted using the Force Evaluation Model (FORCEM) for the OMNIBUS-91F Study and to identify potential areas for model improvement. Although the FORCEM results were not used in the OMNIBUS-91F Study, the comparison to Combat Evaluation Model (CEM) results raised a number of issues. The major conclusions of the report were that FORCEM outputs were based on an internally consistent model with results within reasonable bounds and that CEM and FORCEM outputs will never have an exact match due to different phenomena and level of detail modeled. The POC for further information is LTC Thomas Loggie, US Army Concepts Analysis Agency, DSN 295-5277.

#### **POMCUS Unit Siting Alternatives Study (POMCUSITE)**

The POMCUS unit Siting Alternatives Study, sponsored by the War Reserve Office, U.S. Army Europe, Deputy Chief of Staff, Logistics, developed a decision support tool (model) to assist in POMCUS (prepositioning of materiel configured to unit sets) program management. The study demonstrates the use of the model by redistributing POMCUS assets using a different fill methodology, which developed alternative unit flag siting plans reflecting changes in unit prioritization, and generated optimized equipment transfer lists to accomplish the military objectives. The study report documents the model and results of analyses conducted using the model. The POC for further information is Mr. J. Theodore Ahrens, U.S. Army Concepts Analysis Agency, DSN 295-1056.

### **Probabilistic Foundations for a Fully Stochastic Theater-Level Ground Combat Simulation (PROBATIONS)**

The objective of the PROBATIONS study, sponsored by the Director, CAA, was to develop "proof of principle" computational procedures for aggregating, deaggregating, and processing events that arise from modeling complex stochastic processes in combat operations. Horrigan Analytics, under contract to CAA, performed mathematical research to define and exploit the properties of Locally Independent Events (LIEs) and to develop a prototypal LIE processor, computational procedures and computer programs for representing selected combat processes as LIEs. The research originally sponsored by CAA is being continued under the sponsorship of the Army Research Organization. The POC for further information is Mr. John Warren, US Army Concepts Analysis Agency, DSN 295-1690.

### **Regional Assessment of Combat Capability-Korea (RACCK)**

Regional Assessment of Combat Capability-Korea, sponsored by the Commander in Chief, Combined Force Command (CINC CFC/EUSA) assesses the fiscal year (FY) 91 capability of US and ROK forces to mobilize, deploy, fight and sustain using a regional scenario. It also identifies and assesses the critical factors that inhibit or enhance accomplishment of US military objectives in Korea. The purpose of RACCK was to provide the CINC CFC an assessment of the warfighting capability of OPLAN 5027, to identify areas of risk, to recommend measures that minimize risk and support the commander's intent. The basic approaches used in this study were: (1) to conduct Political-Military games to frame the issues, define the problem and provide insights for the analysts, (2) establish what the baseline combat capability of combined force Korea is, (3) determine the impact of the operational issues by relaxing planning assumptions and (4) arrive at a total force package that supports the commander's intent, is affordable and minimum risk. The POC for further information is COL Joseph Stull, US Army Concepts Analysis Agency, DSN 295-1262.

### **Regional Assessment of Combat Capability-Korea Calculation of Ammunition, Petroleum, and Equipment (RACCK-CALAPER)**

Regional Assessment of Combat Capability-Korea, Calculation of Ammunition, Petroleum, and Equipment; sponsored by the Commander in Chief, Combined Force Command (CINC CFC/EUSA), estimated the munitions, fuel, and Class VII required to support allied ground forces in the Republic of Korea. The POC for further information is Mr. David Williams, US Army Concepts Analysis Agency, DSN 295-1696.

### **Regional Assessment of Combat Capability-Korea Chemical Analysis (RACCK-CHEM)**

The Study was conducted at the request of Combined Forces Command as part of the Regional Analysis of Combat Capability - Korea. It looked at the impact of chemical weapons employment by the DPRK on military operations under OPLAN 5027, including deployment, campaign and sustainment. Study results will be incorporated into the overall RACCK study report when published. The POC for further information is MAJ Jay Hanline, US Army Concepts Analysis Agency, DSN 295-1296.

### **Regional Assessment of Combat Capabilities-Korea Deployment Analysis (RACCK-DA)**

RACCK-DA, sponsored by Commander, US Forces Korea, examined the capability of US to deploy units, ammunition and other resupply to Korea in both a conventional and chemical environment in FY 91. The basic approach followed was to use CAA's TRANSMO as an analytical tool for the measurement and assessment of the US military forces' strategic deployment capability. These results provide unit closure profiles to campaign simulation models that provide insights to the adequacy of forces assigned in a regional war scenario. POC for further information is Ms. Vera Hayes, US Army Concepts Analysis Agency, DSN 295-1583.

### **Regional Assessment of Combat Capabilities-Korea -- FASTALS Analysis (RACCK-FASTALS)**

The RACCK-FASTALS study is a sub-element of the Regional Assessment of Combat Capabilities Korea Study, sponsored by U.S. Forces Korea. It is designed to provide USFK with information regarding the adequacy of Combat Support and Combat Service Support force structure currently allocated to North East Asia. Specific questions for analysis are: What are the Non-Divisional Support Force Structure Requirements and Shortfalls? and What are the impacts on U.S. transportation requirements/capabilities if North Korean SOF targets pipelines, railroads, highways, and/or supply stockages? RACCK-FASTALS utilizes results from the Concepts Evaluation Model (CEM) to generate combat intensities and ammunition consumption, forward line of own troop changes, combat unit casualties and repairable track vehicle damages, and computes the required CS/CSS force structure using the Force Analysis Simulation of Theater Administrative and Logistic Support (FASTALS) model. The POC for further information is LTC James Kievit, US Army Concepts Analysis Agency, AUTOVON 295-5270.



## **Simple Combat Attrition Law Evaluation Data, Phase II (SCALED II)**

The objective of this project was to collect data on selected historical combat engagements for use in empirically evaluating a variety of simple combat attrition laws, including selected natural modifications, analogues, or generalizations. The specific requirement was to document detailed combat data on the evolution of strengths, gains, and losses (detailed as to type, e.g., killed, missing, and wounded-in-action as well as diseased and non-battle related injured). The contractor provided extensive documentation of engagements at Antietam, Westwall, Second Manassas, Gettysburg, Belleau Wood, and Metz. Additionally, research products were provided for engagements at Chancellorsville and Waterloo in less complete form at termination of the contract. The automated data bases are under review for suitability to support desired follow-on research into basic combat phenomenology. Contracting Organization was Science Applications International Corporation and the principal investigator was Mr. Bruce B. Halstead. The POC for further information is Mr. Howard G. Whitley III, US Army Concepts Analysis Agency, DSN 295-1611.

## **Soviet Air Operation Analysis Study (SOVA)**

The SOVA study, sponsored by the Office of the Deputy Chief of Staff for Operations and Plans (DAMO-FDM), assesses the ability of the North Atlantic Treaty Organization (NATO) to defend against Soviet "corridor busting" air raids striking the main operating bases in the NATO Central Region rear area on D-day. The Soviet air operation consists of massed air strikes supported by Tactical Ballistic Missile (TBM) strikes. Defending NATO forces consist of defensive counterair aircraft and ground surface-to-air missile systems coordinated by command and control centers and supported by NATO airborne early warning aircraft. Several levels of TBM range, TBM targeting tactics, TBM warhead types and aircraft numbers were investigated. Results were the level of success of the Soviets in bombing NATO airbases and the numbers of aircraft and ground defenses lost. The POC for further information is Mr. Matthew Ogorzalek, US Army Concepts Analysis Agency, DSN 295-5300.

## **Support Force Requirements Analysis Study, FY99 (SRA-99)**

The Support Force Requirements Analysis Study is normally a biennial study sponsored by ODCSOPS (DAMO-FDF), HQDA. The purpose of the study is to identify support forces needed to support a given combat force in a given scenario (or scenarios). Due to the rapidly changing world political situation and DESERT SHIELD/STORM, a decision was made to delay the start of SRA-99. Numerous assumptions on scenarios, threat and forces were made in the beginning. As better estimates became available, they were integrated into SRA-99. Study results produced a listing of support forces needed and compared them to the forces projected to be available in FY99. This listing assists the Army Staff and MACOMs by providing quantitative analysis results for use in determining the affordable force during the Total Army Analysis

process. The POC for further information is COL Joseph E. Stull, US Army Concepts Analysis Agency, DSN 295-1262.

### **Strategic Deployment Analysis Review Study (STRADER)**

The STRADER study, sponsored by Deputy Chief of Staff for Logistics, HQDA, investigates the appropriateness of assumptions, data and models used in the conduct of Army strategic deployment analyses by comparison of these key elements with the actual experience of the Operations Desert Shield deployment. The baseline for comparison was the Major Regional Conflict (MRC)-East scenario (JMNA-90) August 1990, prior to Base Case A. The study showed that both scenario assumptions and planning factors were optimistic when compared to the same data derived from Operations Desert Shield. Accordingly, the use of these optimistic assumptions and planning factors in deployment simulations using CAA's TRANSMO resulted in delivery profile estimates far exceeding that experienced in Operations Desert Shield. When all possible TRANSMO parameters were set to mirror the results achieved in Operations Desert Shield, the TRANSMO simulated deployment estimate was within 10 percent of the results reported throughout the deployment by the US Transportation Command (USTRANSCOM). The POC for further information is CPT Elizabeth A. Vance, US Army Concepts Analysis Agency, DSN 295-0027.

### **Theater Analytic Nuclear Model (TACNUC)**

Theater Analytic Nuclear Model (TACNUC) is the implementation contract for the Nuclear Effects Model Embedded Stochastically in Simulation (NEMESIS). TACNUC is a model coding effort conducted by Science Applications International Corporation (SAIC). Both NEMESIS and the follow-on TACNUC study efforts were conducted by MAJ Mark A. Youngren. TACNUC provides a means of representing the effects of nuclear warfare in the theater level Force Evaluation Model (FORCEM). The POC for further information is Mr. Robert Barrett, US Army Concepts Analysis Agency, DSN 295-1655.

### **Tactical Wheeled Vehicle Modernization Update (TWVMU)**

The TWVMU study, sponsored by the Office of the Assistant Deputy Chief of Staff for Operations and Plans - Force Development (ODCSOPS), Headquarters, Department of the Army (HQDA), was an acquisition analysis of DCSOPS tactical wheeled vehicle modernization strategy to determine the quantities of tactical wheeled vehicles that should be procured, service-life-extended, maintained, and retired to meet modernization requirements and force structure goals. The approach used was to model the production, useful life, and eventual retirement of the tactical wheeled vehicles as a mathematical optimization problem under four acquisition alternatives. Two optimization strategies, "minimize procurement and Operations and Support (O&S) cost" and

"maximize modernization" were applied to each one of the four acquisition alternatives. There were four principle findings; (1) there were insufficient procurement dollars to purchase base case programmed buys during FY93 and FY94, (2) the procurement scheme for the commercial utility cargo vehicle (CUCV) mission area restricts program flexibility since the production line is open only two years at a time, once every twelve years, (3) there are two instances (FY02 & 12), in the base case (maximize modernization) where the Force Modernization Analyzer (FOMOA) Model does not spend all of the procurement budget despite buying the maximum number of systems allowable. The POC for further information is LTC Alois Dopita, US Army Concepts Analysis Agency, DSN 295-1377.

#### **Value Added Analysis 90-97 (VALUE ADDED)**

The Value Added Analysis methodology is a decision support system that will assist decision makers in evaluating and prioritizing competing alternatives in the POM building process. The Value Added Analysis concept uses a family of models to measure an alternative's explicit (objective) contribution to the program as an incremental or decremental change to the current program base. A hierarchical assessment framework is used to develop an alternative's scores. This assessment framework is used to evaluate changes against the current program base as the consequences of program alternatives are considered. Value Added Analysis results in measuring an alternative's relative value in the context of a larger value system. This relative value is either used directly by decisionmakers, or is fed into a mathematical optimization model which simultaneously determines an alternative's cost-benefit, and conducts a trade-off between alternatives. The POC for further information is LTC Robert Koury, US Army Concepts Analysis Agency, DSN 295-1546.

## **FY 91 Quick Reaction Analyses**

### **Army Aviation Modernization Update (AAMU)**

The AAMU quick reaction analysis, sponsored by the Office of the Assistant Deputy Chief of Staff for Operations and Plans - Force Development (DAMO-FD), Headquarters, Department of the Army (HQDA), was to conduct an acquisition analysis of DCSOPS Aviation Systems Modernization strategy so as to determine the quantities of aviation systems that should be procured, maintained, and retired to meet modernization requirements and force structure goals. The approach used was to model the production, useful life, and eventual retirement of the aviation systems as a mathematical optimization problem. Six scenarios were examined. Two optimization strategies, "minimize lifecycle cost" and "maximize modernization" were applied against each one of the six scenarios. The POC for further information is LTC Dopita, US Army Concepts Analysis Agency, DSN 295-1377.

### **Army Aviation Modernization Update-Scout Relook (AAMU-SR)**

The purpose of the AAMU-SU quick reaction analysis, sponsored by the Office of the Assistant Deputy Chief of Staff for Operations and Plans - Force Development (DAMO-FD), Headquarters, Department of the Army (HQDA) was to conduct an acquisition analysis of DCSOPS Aviation Systems Modernization strategy so as to determine the quantities of scout helicopters that should be procured, converted, maintained, and retired. The goal was to minimize scout helicopter shortfalls, relative to the minimum aviation force structure (80 percent of the 18/4 force), shown in the AAMU QRA published by CAA in January 1991 as CAA-MR-91-6. The approach used was to model the production, conversions, useful life, and eventual retirement of the scout helicopters as a mathematical optimization problem. Three scenarios were examined using a "minimize lifecycle cost" optimization strategy. The POC for further information is LTC Dopita, US Army Concepts Analysis Agency, DSN 295-1377.

### **AirLift Force Study (ALF-1)**

The ALF-1 Study, sponsored by the Air Force Center for Studies and Analysis, Mobility and Operability Division, (AFCSA/SAGO), was done as a quick reaction analysis (QRA) to assess the impact of airlift upon the theater campaign. The Concepts Evaluation Model (CEM) was used to simulate conflict using the most current Southwest Asia scenario developed for the Joint Chiefs of Staff. The results of the simulations were used to develop alternative airlift measures of effectiveness (MOE). The sole existing MOE, the million ton mile (MTM), incorporates weight, distance, and time to distinguish different fleet capabilities. However, this provides the ground commander in the field little understanding of the affect of airlift on combat power at his disposal and does not show decision makers the affect different fleets have on the outcome of the conflict. This QRA assisted in the development of MOEs that show the impact airlift has on the outcome of the conflict. The POC for

further information is Mr. Louis J. Albert, U.S. Army concepts Analysis Agency, DSN 295-1526.

### **Army Vision Deployment Analysis (ARVIS-DA)**

The ARVIS-DA (QRA), sponsored by the Strategic Mobility Division, ODCSLOG provides further insights into the Army's strategic analysis of the Major Regional Conflict-East. The basic approach followed was to use CAA's TRANSMO as an analytical tool for the measurement and assessment of the U.S. mobility forces strategic deployment capability. The analysis examined the impact of key parameters (additional strategic lift and varying loading capacities) upon the projected arrival schedule of US forces. The principal finding is that with additional sealift a second heavy division arrives in theater in the specified period as postulated. POC for further information is Vera Hayes, U.S. Army concepts Analysis Agency, DSN 295-1583.

### **Political-Military Game BALBOA 91 (BA91)**

The Commander, U.S. Army South (USARSO), requested that the U.S. Army Concepts Analysis Agency conduct a political-military game to examine potential options for him to assist the Government of Panama in ways that would contribute to enhancement of USARSO's Peacetime Engagement and its defense and overall security of the Panama Canal. The Office of the Deputy Chief of Staff for Operations and Plans (ODCSOPS), Headquarters, Department of the Army (HQDA) cosponsored the game. The game, held at CAA on 25 March 1991, was enhanced by the participation of GEN(RET) Maxwell R. Thurman, a former Commander-in-Chief, U.S. Southern Command (SOUTHCOM), GEN (RET) William R. Richardson, former Commander 193rd Separate Infantry Brigade, as well as MG William W. Hartzog, Commander, U.S. Army South (USARSO). The final report documents the results of the game. The POC for further information is LTC Jeffrey A. Paulus, US Army Concepts Analysis Agency, DSN 295-4715.

### **CORBAN Air Defense Artillery Validation and Review (CADA VR)**

This study, sponsored by PA&E, provided detailed analyses of the CORBAN air defense module to provide a more accurate interpretation of the air-to-ground and the ground-to-air war and their effect on the maneuver force. The POC for further information is LTC Michael Vick, US Army Concepts Analysis Agency, DSN 295-1688.

### **Chemical Attacks Against Contingency Staging Areas (CASIO)**

The CASIO QRA, sponsored by the Office of the Deputy Chief of Staff for Operations and Plans (ODCSOPS), Headquarters, Department of the Army (HQDA) provides an assessment of the potential impact of chemical attacks against a

contingency force's staging areas. The QRA methodology used the chemical weapons effects produced by a high resolution model, Chemical Casualty Assessment System (CHEMCAS) in conjunction with an intertheater transportation model (TRANSMO), to simulate the delay that arriving forces would experience while processing through contaminated ports. Movement assumptions were varied to determine the range of arrival times and tonnages that movement categories would experience. Movement priorities for selected types of units that have a capability to mitigate the effects of chemical contamination were increased and the tradeoff between their arrival and combat units was assessed. POC for further information is MAJ Hudson Webb, US Army Concepts Analysis Agency, DSN 295-1263.

### **Congressionally Mandated Mobility Study II - CINC Options (CMMS II-CO)**

CMMS II-CO provided movement requirement analyses that were conducted for five study scenarios: NATO, Major Regional Conflict-East CINC Options, Major Regional Conflict-East CINC Options revised, Major Regional Conflict-West CINC Options, and lesser Regional Conflict within 6,000 miles of CONUS (LRC-6000). Delivery of the data files to DALO-TSM occurred between 15 June 1991 and 30 August 1991. POC for further information is Mr. Jose Imperial, US Army Concepts Analysis Agency, DSN 295-1658.

### **Congressionally Mandated Mobility Study, NATO (CMMS-NATO)**

CMMS-NATO, sponsored by the Office of the Chief of Staff for Operations and Plans (ODCSOPS), Headquarters, Department of the Army (HQDA), determines transportation requirements for the deployment of US forces to the NATO Theater. This portion of the study, conducted by Forces Directorate, US Army Concepts Analysis Agency, specifically determined force totals for each functional area based on the combat unit list and deployment schedule provided by ODCSOPS. The Force Analysis Simulation of Theater Administrative and Logistic Support (FASTALS) Model was used to provide a time phased troop deployment list which includes combat, combat support and combat service support forces. The results of this portion of the study were provided to Strategy and Plans Directorate, US Army Concepts Analysis Agency, for the purpose of determining transportation requirements. POC for further information is MAJ Lee Colbert, US Army Concepts Analysis Agency, DSN 295-5269.

### **Congressionally Mandated Mobility Study, Northeast Asia (CMMS-NEA)**

CMMS-NEA, sponsored by the Office of the Chief of Staff for Operations and Plans (ODCSOPS), Headquarters, Department of the Army (HQDA), determines transportation requirements for the deployment of US forces to the Northeast Asia Theater. This portion of the study, conducted by Forces Directorate, US Army Concepts Analysis Agency, specifically determined force totals for each functional area based on the combat unit list and deployment schedule

provided by ODCSOPS. The Force Analysis Simulation of Theater Administrative and Logistic Support (FASTALS) Model was used to provide a time phased troop deployment list which includes combat, combat support and combat service support forces. The results of this portion of the study were provided to Strategy and Plans Directorate, US Army Concepts Analysis Agency, for the purpose of determining transportation requirements. POC for further information is MAJ Lee Colbert, US Army Concepts Analysis Agency, DSN 295-5269.

#### **Congressionally Mandated Mobility Study, Southwest Asia (CMMS-SWA)**

CMMS-SWA, sponsored by the Office of the Chief of Staff for Operations and Plans (ODCSOPS), Headquarters, Department of the Army (HQDA), determines transportation requirements for the deployment of US forces to the Southwest Asia Theater. This portion of the study, conducted by Forces Directorate, US Army Concepts Analysis Agency, specifically determined force totals for each functional area based on the combat unit list and deployment schedule provided by ODCSOPS. The Force Analysis Simulation of Theater Administrative and Logistic Support (FASTALS) Model was used to provide a time phased troop deployment list which includes combat, combat support and combat service support forces. The results of this portion of the study were provided to Strategy and Plans Directorate, US Army Concepts Analysis Agency, for the purpose of determining transportation requirements. POC for further information is MAJ Lee Colbert, US Army Concepts Analysis Agency, DSN 295-5269.

#### **Congressionally Mandated Mobility Study 2, Army Mobility Data (CMMS2-AMD)**

The CMMS2-AMD, sponsored by ODCSLOG, HQDA, provided movement requirements databases for the Army's projected FY99 POM forces in order to support the Mobility Requirements Study (MRS) being conducted by Joint Chief of Staff and Office of the Secretary of Defense. MRS provides Congress with an updated review and analysis of alternative strategic mobility programs necessary to satisfy the requirement of US strategy both in the 1990's and into the 21st Century. The databases provided in the CMMS2-AMD addressed scenarios for a Major Regional Conflict-East (MRC-E), accelerated Major Regional Conflict-East (MRC-EA), Major Regional Conflict-West (MRC-W), and a Lesser Regional Conflict occurring 2000 miles from CONUS (LRC-2000). The databases were formulated in Movement Requirements for Staff Planning and Special Studies Application (MORSA) format and forwarded to the Army Staff for approval and for input into the MIDAS deployment model for further analysis. The analysis director was MAJ Stafford G. Conley, and the POC for further information is Mr. Frank McKie, US Army Concepts Analysis Agency, DSN 295-1699.

### **CORBAN Centralized Forces Europe (CORCFE)**

This effort, sponsored by PA&E, provided base and excursion cases and associated analyses to show the combat potential of numerous corps level weapons in a CFE environment. The POC for further information is CPT Patrick Williams, US Army Concepts Analysis Agency, DSN 295-1027.

### **Contingency Operations Southwest Asia - Alternative Forces - Munitions and Equipment Analysis (COSWA-AF-MEA)**

The COSWA-AF-MEA Quick Reaction Analysis, sponsored by the Office of Deputy Chief of Staff for Operations and Plans (DAMO-FDL), provided a series of quantitative assessments of class V ammunition consumption and class VII equipment attrition estimates for several simulated SWA conflict situations. These assessments were designed to provide ODCSOPS, OFCS, and OSD staff members with information to support planning and resource allocation for Operations Desert Shield/Storm. The scope of this analysis involved variations in the U.S. force levels as projected in the October 1990 timeframe. The series of theater campaign results were briefed and documented in numerous memorandum reports in the Fall of 1990. Consumption and attrition estimates were provided in briefings, printouts, and on PC disks in late 1990 and early 1991. Final QRA results from this effort and other related analyses concerning munition and materiel requirements were consolidated into a CAA Memorandum Report entitled Contingency Operations Southwest Asia - Requirements Analysis (COSWA-RAN), dated July 1991, and concluded the documentation on this effort. The POC for further information is Mr. Frank O. Gould, U.S. Army Concepts Analysis Agency, DSN 295-5261.

### **Contingency Operations in Southwest Asia Air Interdiction Maneuver (COSWA-AIM)**

COSWA-AIM Quick Reaction Analysis, sponsored by the Office of the Deputy Chief of Staff for Operations and Plans (DCSOPS), Headquarters, Department of the Army (HQDA) is a comprehensive multiphase analysis of sustainability in the context of Operation Desert Shield. Measures of effectiveness include combatant casualties and permanent losses of major end items. The analysis was based on campaign results obtained with the Concepts Evaluation Model VI (CEM IV). POC for further information is MAJ Daniel J. Russell, US Army Concepts Analysis Agency, DSN 295-1594.

### **Contingency Operations in Southwest Asia Alternative Contingencies (COSWA-ALT)**

COSWA-ALT, sponsored by the Office of the Chief of Staff for Operations and Plans (DAMO-SSW), Headquarters, Department of the Army (HQDA), determines combat support/combat service support requirements for the deployment of US forces to Southwest Asia in several scenario variations. This QRA, specifically determined force totals for each functional area based on the



combat unit list and deployment schedule provided by ODCSOPS. The Force Analysis Simulation of Theater Administrative and Logistic Support (FASTALS) Model was used to provide a time phased troop deployment list which includes combat, combat support and combat service support forces. The POC for further information is MAJ Lee Colbert, US Army Concepts Analysis Agency, AUTOVON 295-5269.

#### **Contingency Operations Southwest Asia - Division Casualty Stratification Analysis (COSWA-DCAS)**

COSWA-DCAS was sponsored by the Office of the Deputy Chief of Staff for Personnel (DAPE-MP). In November 1990, DAPE-MP requested an estimate of personnel replacement requirements that could be expected from the Desert Shield operation. The information provided was to be used in developing training base guidance as well as estimating training base requirements. The analysis used casualty estimates developed in the Concepts Evaluation Model (CEM) and patient flow data for only division echelon forces. Detailed casualty and replacement estimates were developed down to the MOS level using CAA Wartime Manpower Planning System (WARMAPS) modeling programs. A 7 2/3 division Army force deploys into the theater over a 120 day buildup period and grew to 128,300 personnel. During this buildup period an estimated 8,400 hospital admitted Disease and Nonbattle injury cases were identified of which 3,700 would require replacement. During the initial 10 day combat period, over 10,000 battle and nonbattle casualties were identified of which 8,300 require replacement. In the initial 10 day combat period, 60% of the hospital admitted casualties were in the close combat (CC) and other (OC) categories. Replacements were required for 86% of the hospital admitted CC and OC personnel. Stratified replacement requirement estimates were collected for 60 days of simulated combat. The POC for further information is Mr. Stanley Miller, US Army Concepts Analysis Agency, DSN 295-5264.

#### **Contingency Operations in Southwest Asia Requirements Analysis (COSWA-RAN)**

The COSWA-RAN Quick Reaction Analysis, sponsored by the Office of the Deputy Chief of Staff for Operations and Plans (DAMO-FDL), provided a series of quantitative assessments of Class V ammunition consumption and Class VII equipment attrition for several simulated SWA conflict situations. These assessments were designed to provide ODCSOPS, OJCS, and OSD staff members with information to support planning and resource allocation for operations DESERT SHIELD and DESERT STORM. The series of theater campaigns were briefed and documented in numerous memorandum reports in the Fall of 1990. Consumption and attrition data estimates were provided in briefings, printouts, and on PC diskettes in late 1990 and early 1991. The COSWA-RAN Memorandum Report consolidates all of the requirements information into one document and concludes that study effort. The POC for further information is Mr. Frank O. Gould, US Army Concepts Analysis Agency, DSN 295-5261.

### **Contingency Operations in Southwest Asia Residual Force Requirements (COSWA-RES)**

The Residual Force Requirements study was sponsored by the Office of the Deputy Chief of Staff for Operations and Plans (DAMO-FD) to determine the combat support and combat service support units necessary to provide administrative and logistical support to the units remaining in Saudi Arabia after the war with Iraq. Various sized combat configurations and proposed POMCUS packages were used as inputs to the FASTALS model and the resulting troop lists were evaluated by the functional area analysts to develop the minimum essential force for each of the contingencies. The results from each of the excursions were provided to DAMO-FDF to assist in their planning for the post-war forces to remain in the Middle East. The POC for further information is Mr. Raymond McDowall, US Army Concepts Analysis Agency, DSN 295-5264.

### **Contingency Operations in Southwest Asia Supportability Analysis (COSWA-SPT)**

COSWA-SPT Quick Reaction Analysis (QRA), sponsored by the Office of the Deputy Chief of Staff for Operations and Plans (ODCSOPS), Headquarters, Department of the Army (HQDA) evaluates the supportability of alternative force structures in Operation Desert Shield. Supportability in the areas of transportation, supply, and maintenance is examined. The analysis was based on campaign results obtained with the Concepts Evaluation Model VI (CEM IV). The POC for further information is MAJ Daniel J. Russell, US Army Concepts Analysis Agency, DSN 295-1594.

### **Contingency Operations in Southwest Asia - Stockage (COSWA-STK)**

The COSWA-STK Quick Reaction Analysis (QRA), sponsored by the US Army Concepts Analysis Agency (CAA), determined theater replacement stocks for Major Equipment Items and personnel for contingency operations in Southwest Asia. Estimates were based on a three phase campaign beginning with an air campaign and concluding with ground operations, for two corps consisting of 7 2/3 divisions. POC for further information is LTC Charles Shelton/MAJ Daniel Russell, US Army Concepts Analysis Agency, DSN 295-1588.

### **Contingency Operations Southwest Asia - Stockage - Munitions, Equipment Analysis (COSWA-STK-MEA)**

The COSWA-STK-MLA Quick Reaction Analysis (QRA), sponsored by the Office of Deputy Chief of Staff for Operations and Plans (DAMO-FDL), provided a quantitative assessment of class V ammunition consumption and class VII equipment attrition estimates for the simulated SWA conflict situation. This assessment was designed to provide ODCSOPS, OJCS, and OSD staff members with information to support planning and resource allocation for Operations Desert Shield/Storm. The scope of the analysis involved a larger US force level

(November 1990 projection) and a different campaign strategy by US and coalition forces, than had been previously considered. The theater campaign results were briefed and documented in the Fall of 1990. Initial consumption and attrition estimates were provided in briefings and hard copy format in late 1990 and early 1991. Final results from this effort and other related analyses concerning munition and materiel requirements were consolidated into a CAA Memorandum Report entitled Contingency Operations Southwest Asia - Requirements Analysis (COSWA-RAN), dated July 1991, and concluded the documentation on this effort. The POC for further information is Mr. David E. Williams, U.S. Army Concepts Analysis Agency, DSN 295-1696.

### **Contingency Operations in Southwest Asia Summary (COSWA-SUM)**

COSWA-SUM Quick Reaction Analysis (QRA), sponsored by the Office of the Deputy Chief of Staff for Operations and Plans (ODCSOPS), Headquarters, Department of the Army (HQDA), is a comprehensive multiphase analysis of combat in the context of Operation Desert Shield. Measures of effectiveness include combatant casualties and permanent losses of major end items. The analysis is based on campaign results obtained with the Concepts Evaluation Model VI (CEM VI). The analysis director was CPT Jeffrey A. Appleget, and the POC for further information is LTC Charles Shelton, US Army Concepts Analysis Agency, DSN 295-1588.

### **Contingency Operations in Southwest Asia Summary Update (COSWA-SUM-UP)**

COSWA-SUM-UP Quick Reaction Analysis (QRA), sponsored by the Office of the Deputy Chief of Staff for Operations and Plans (ODCSOPS), Headquarters, Department of the Army (HQDA), is a comprehensive multiphase analysis of combat in the context of Operation Desert Shield using updated threat data. Measures of effectiveness include combatant casualties and permanent losses of major end items. The analysis is based on campaign results obtained with the Concepts Evaluation Model VI (CEM VI). The analysis director was CPT Jeffrey A. Appleget, and the POC for further information is LTC Charles Shelton, US Army Concepts Analysis Agency, DSN 295-1588.

### **Contingency Operations in Southwest Asia Summary FORSCOM (COSWA-SUMFOR)**

COSWA-SUMFOR Quick Reaction Analysis (QRA), sponsored by the Office of the Deputy Chief of Staff for Operations and Plans (ODCSOPS), Headquarters, Department of the Army (HQDA), is a comprehensive multiphase analysis of combat in the context of Operation Desert Shield using updated threat data. Measures of effectiveness include combatant casualties and permanent losses of major end items. The analysis is based on campaign results obtained with the Concepts Evaluation Model VI (CEM VI). The analysis director was CPT

Jeffrey A. Appleget, and the POC for further information is LTC Charles Shelton, US Army Concepts Analysis Agency, DSN 295-1588.

### **Contingency Operations Southwest Asia - Support Analysis (COSWA-SUPAN)**

The COSWA-SUPAN Quick Reaction Analysis (QRA), sponsored by The Office of the Deputy Chief of Staff for Operations and Plans, War Plans Division (DAMO-SSW), was one in a series of responsive quantitative assessments of the force capabilities of US and allied forces deploying on Operation Desert Shield/Storm. It was designed to provide ODCSOPS, OJCS, and OSD staff with information regarding intratheater transportation capabilities to support proposed courses of action. The QRA was based on US, allied, and Iraqi force structure estimates available on 15 October 1990. The QRA utilized results from the Concepts Evaluation Model (CEM) to generate combat intensities, estimate durations of each phase of the proposed operation, and identify forces to be supported at each location during each time period; required resupply tonnages were then computed and the number of truck companies required for support determined. The POC for further information is LTC James Kievit, US Army Concepts Analysis Agency, AUTOVON 295-5270.

### **Contingency Operations in Southwest Asia Extended Air Operations (COSWA-XAIR)**

COSWA-XAIR Quick Reaction Analysis, sponsored by the Office of the Deputy Chief of Staff for Operations and Plans (DCSOPS), Headquarters, Department of the Army (HQDA) was a comprehensive multiphase analysis of sustainability in the context of Operation Desert Shield. Measures of effectiveness included combatant casualties and permanent losses of major end items. The analysis was based on campaign results obtained with the Concepts Evaluation Model VI (CEM VI). The analysis director was CPT Jeffrey A. Appleget, and the POC for further information is LTC Charles Shelton, US Army Concepts Analysis Agency, DSN 295-1588.

### **Cost Variability Analysis (COVARA)**

The COVARA QRA, sponsored by the Army Security Assistance Command, provides tabular summarizations of estimated and final sale prices by dollar value, sale type, and major command. The summarizations showed that all over-estimates exceeded 10 percent of the estimated price. Sales having a negative actual sale price were identified. Those sales with less than a \$5 difference between estimated and actual prices were also identified. There appeared to be no difference in the Major Support Commands' estimation capabilities. The POC for further information is Mr. Carl B. Bates, US Army Concepts Analysis Agency, DSN 295-0163.

### **Post-CFE Posture Assessment (CPOST)**

The CPOST study, sponsored by the Deputy Chief of Staff for Operations and Plans, Headquarters Department of the Army, was the latest in a long series of Army assessments of the post-CFE security environment in Europe. The study examined a range of operational variants shaping a simulated campaign in the Central European Region. In every case, the baseline Soviet force was substantially augmented by treaty circumvention, that is, by fielding and/or filling units with equipment readily available only because of the large-scale redeployments that preceded Treaty signature. Such reinforcement must be assumed in any capabilities-based formulation of a post-CFE Soviet force under unobserved conditions. A fundamental aim of the assessment was to examine successive results of simulated campaigns that include, and then exclude, circumvention-based reinforcement, and thus help define military significant risks associated with Treaty regime. The author was LTC Dorn Crawford and the POC for more information is CPT(P) John Regan, U.S. Army Concepts Analysis Agency, DSN 295-1057.

### **CFE Circumvention Risk Assessment (CRISK)**

CRISK was commissioned by the Conventional Arms Control Division of Army DCSOPS in February 1991. The CRISK assessment is part of the series of assessments that examined a range of operational variants in simulated campaigns in support of the CFE Treaty negotiation and ratification process. CRISK addressed emerging concerns on Soviet circumvention of the CFE Treaty. This analysis focused on evolving Soviet force restructuring forecasts and particularly on the force generation potential of large scale pre-CFE Soviet redeployments of weapon systems from the Atlantic to the Urals region (ATTU). This reorientation, from cheating to circumvention, represented a key conceptual shift from the original assessment. This distinction defined the set of assumptions which drove the assessment's scenario development. The study helped define the potential risks to NATO associated with these redeployments. The author of the study was LTC Dorn Crawford and the POC for more information is CPT(P) John S. Regan, U.S. Army Concepts Analysis Agency, DNS 295-1057.

### **Detailed Analysis and Investigation of Resource Items and Costs of Weapon Systems (DAIRICOWS)**

The purpose of the DAIRICOWS Quick Reaction Analysis, sponsored by the Office of the Assistant Deputy Chief of Staff for Operations and Plans (DCSOPS, DAMO-FDR), Headquarters, Department of the Army (HQDA), was to provide key life cycle cost (LCC) components for the following weapon systems: Single Channel Ground and Airborne Radio System (SINGARS), Defense Satellite Communications System (DSCS), Heavy Tactical Vehicles (HTV), Line of Sight Antitank (LOS-AT), and Line of Sight - Forward - Heavy (LOS-F-H) in accordance with the Army Resource Integration and Management (ARIM) methodology developed by the Concepts Analysis Agency for ODCSOPS. Baseline Cost Estimates (BCEs) and the Major Item System Map (MISM) database were used to obtain key LCC data. The goal was to provide DAMO-FDR with LCC data to

use in the Program Objective Memorandum building process in lieu of acquisition costs traditionally used. The point of contact for further information is Mr. Joel Gorden, US Army Concepts Analysis Agency, DSN 295-1682.

#### **Desert Shield Air Defense--Free Rocket Over Ground (DSAD-FROG)**

The sponsor tasked CAA to provide insights into the ability of US Army defense units to provide tactical ballistic missile defense to maneuver force conducting breaching operations against Iraqi defensive lines. The study objectives were: to determine if using a weighted average PK would give better agreement with actual Patriot system performance; to assess the potential Patriot capability against FROGs using two different firing doctrines; to assess what is the potential ability of the Hawk system to engage FROG missiles. The major finding was Patriot performance against the FROG so often achieved first round intercept, Shoot-Look-Shoot should be examined as the firing doctrine to be used. The analytic director was CPT Wayne J. VanGorden, and the POC for further information is Mr. Tom Rose, US Army Concepts Analysis Agency, DSN 295-0270.

#### **Desert Storm Air Defense Patriot Stockage (DSAD-PS)**

The DSAD-PS Quick Reaction Analysis (QRA), sponsored by DAMO-FD, was conducted to analyze and forecast the sustainability of PAC-2 Patriot Missiles under expected conditions; identify alternatives which would decrease depletion rate; quantify the increased sustainability; and examine any risks and determine the shortfall of PAC-2 missiles, if any. The POC for further information is COL John B. Harrington, US Army Concepts Analysis Agency, DSN 295-1607.

#### **Desert Shield Air Warfare - ATACMS Employment (DSAW-ATEMS)**

This study, sponsored by DAMO-FDE, provided detailed analyses of the potential capability of Joint and Combined forces to conduct suppression of enemy air defenses and battlefield air interdiction missions against Iraqi Forces utilizing ATACMS. The POC for further information is Ms. Renee Carlucci, US Army Concepts Analysis Agency, DSN 295-5292.

#### **Desert Shield Air Warfare - Extended Air Defense Analysis (DSAW-EAD)**

DSAW-EAD analyzed the ability of the integrated air defense network in Saudi Arabia to defend with Patriot against Tactical Ballistic Missile (TBM) attacks, followed up with bombers escorted by fighters and air defense suppression aircraft. The scope of the analysis involved defensive aircraft available within the Southwest Asia theater along with the air defense missile systems available with the committed air defense units. Red forces

were taken from the most recent intelligence documents available to this Agency. The basic approach was to array Blue forces in the COMO Air Defense Model and evaluate them on their ability to defend against preemptive TBM strikes; then followed by a Soviet-style massed air attack. The final variation was to use time on target attacks by Iraqi air forces with approach routes that avoided the ground air defense to the maximum extent practical. This was intended to represent maximum stress on the integrated system. The analysis director was MAJ Wayne J. VanGorden, the POC is Mr. Tom Rose, US Army Concepts Analysis Agency, DSN 295-0270.

#### **Desert Shield Air Warfare - Israeli Urban Defense (DSAD-IUD)**

The DSAW-IUD analysis was to determine the relative ability of the Israeli Defense Forces (IDF) to defend Israeli airspace assisted by selected US forces. The scope of the study involved defensive aircraft available within Israel along with the strategic Hawk and Patriot air defense missile systems available for both conventional air defense and TBM defense. Red forces were those bomber aircraft available from specified northern airfields along with escort fighters. Jordanian Hawk units were modeled as a threat to IDF aircraft, and a partial threat to those of Iraq. The basic approach was to array Blue forces in the COMO Air Defense Model and evaluate them on their ability to defend against Soviet-style massed air attack on Tel Aviv. Then variations were modeled to assess the relative contributions of Patriot units, carrier-based F14 aircraft, increased early warning, and a combination of these factors. The analysis director was MAJ Wayne J. VanGorden, the POC is Mr. Tom Rose, US Army Concepts Analysis Agency, DSN 295-0270.

#### **Desert Storm Campaign Analysis (DSCA) Vol I - (DSCA I), Vol II - (DSCA II), Vol III - (DSCA III), Vol IV - (DSCA IV), Vol V - (DSCA V)**

The DSCA series of Quick Reaction Analyses (QRA), sponsored by the Deputy Chief of Staff for Operations and Plans (DCSOPS), Headquarters, Department of the Army (HQDA), analyzes all facets of the Desert Storm Campaign from supportability to outcome. DSCA I was based on initial coalition and Iraqi force data. Each subsequent QRA was based on updated data from the previous QRA. POC for further information is LTC Charles Shelton/MAJ Daniel Russell, US Army Concepts Analysis Agency, DSN 295-1588.

#### **Desert Shield Lessons Learned (DSLL)**

The purpose of the DSLL analysis, sponsored by the Concepts, Doctrine and Force Policy Division, Office of the Deputy Chief of Staff for Operations and Plans (DAMO-FDQ), was to develop a methodology that will allow strategic lessons learned from Operation Desert Shield to be effectively and efficiently formulated and implemented. The methodology provides a logical framework for developing strategic lessons learned and recommendations for improving HQDA, Army, or joint operations through changes to doctrine

procedures, organizations, training, materiel, or leader development. the Joint Universal Lessons Learned System (JULLS), which is currently used to store lessons learned information of the Services, can be used to incorporate the information provided by each step of the methodology. The POC for further information is Mr. Steven Siegel, US Army Concepts Analysis Agency, DSN 295-5289.

#### **European Transportation Roundout Support (ETRANS-FOS)**

The ETRANS-FOS portion of the ETRANS study was conducted by the Support Force Analysis Division of the Forces Directorate. It determined variations in combat support/combat service support structure in the European Theater under a multitude of transportation force structures. The Force Analysis Simulation of Theater Administrative and Logistic Support (FASTALS) Model was used to provide a time phased troop deployment list which includes combat, combat support and combat service support forces. POC for further information is MAJ Lee Colbert, US Army Concepts Analysis Agency, DSN 295-5269.

#### **Floating POMCUS (FLOATPOM) Analysis**

The FLOATPOM Quick Reaction Analysis (QRA), sponsored by ODCSLOG, HQDA, provided a rapid evaluation of the use of MTMC ships to warehouse POMCUS projects and reported on the number of each of the 13 types of ships, including breakbulk and roll on roll off, required to move and store USAREUR POMCUS stocks. June 1990 POMCUS property book data was used as the data source. The ship requirements for both onhand and authorized equipment were reported separately. The POC for further information is Mr. Ted Ahrens, US Army Concepts Analysis Agency, DSN 295-1056.

#### **Forward Deployed Force Alternative (FOD-FDAT)**

The FOD-FDAT Quick Reaction Analysis (QRA), sponsored by the Vice Chief of Staff of the Army (VCSA), evaluated capabilities of different forward deployed force structures during FY 1994-1999. Threat forces were varied using Intelligence and Threat Analysis Center (ITAC) developed force generation rates. Force structure capabilities were compared using four Measures of Effectiveness (MOE): FEBA Movement, Fractional Exchange Ratios (FER), Major Equipment Item (MEI) losses, and US Combatant Casualties. POC for further information is CPT Thomas Pratt/MAJ David Knudson, US Army Concepts Analysis Agency, DSN 295-1592.

#### **Force Modernization Sensitivity Analysis (FOMOSA)**

The purpose of the FOMOSA quick reaction analysis, sponsored by the Technical Advisor to the Deputy Chief of Staff for Operations and Plans, Headquarters,



Department of the Army (HQDA), was to conduct a sensitivity analysis using the Force Modernization Analyzer (FOMOA) Model to determine the sensitivity of varying budget constraints, mission areas, and modernization weights upon the investment strategy of selected weapons systems and to identify the conditions under which systems are not procured. The five systems analyzed were: TOW sight improvement program (TSIP), line of sight anti-tank missile (LOSAT), non-line of sight missile (NLOS), advanced anti-tank weapon system - medium (AAWS-M) and LONGBOW. The approach used was to model the production of the five systems as a mathematical optimization problem. The principal finding was the model's sensitivity to the single and multiple mission formulation of investment strategies. In the multiple mission formulation, all mission areas are considered to be equally important, and FOMOA attempts to spread budget and modernization weight changes among them to achieve a balanced force. In the single mission formulation, FOMOA favors the systems with the best cost/modernization ratios. The only situation under which systems will not be procured occurs in a single mission formulation. Here systems are traded-off against each other based upon their cost/modernization ratios. A severe enough budget cut (i.e., 90 percent) will eliminate those systems with the highest costs and the lowest modernization weights first. The POC for further information is LTC Dopita, US Army Concepts Analysis Agency, DSN 295-1377.

#### **Force Regeneration/Reconstitution - Mobility Analysis (FORR-MAN)**

The Force Regeneration/Reconstitution - Mobility Analysis (FORR-MAN) was conducted for the Office of the Deputy Chief of Staff for Operations and Plans (DCSOPS). FORR-MAN examines the strategic mobility impact of alternative levels of readiness for Reserve Component (RC) divisions and brigades on North Atlantic Treaty Organization (NATO) force closure profiles within the context of the Europe C scenario (post-CFE agreement 2-year force expansion), fiscal year 99-01. Closure estimates were determined using CAA's TRANSMO. The POC for further information is MAJ Robert G. Albrecht, Jr., US Army Concepts Analysis Agency, DSN 295-1657.

#### **Global Excursion of Transportation Allocation Rules (GE-TAR)**

GE-TAR is sponsored by the US Army Transportation School (ATSP-CDO). The sponsor is in the process of recomputing the capability statements in truck unit TOEs using a 90% availability factor vis-a-vis the 75% factor traditionally used. This could impact future allocation rules used in the Force Analysis Simulation of Theater Administrative and Logistic Support (FASTALS) Model to generate support force requirements. The only units whose allocation rules are affected by this excursion request are the Medium Truck companies. FASTALS excursions using the TAA-96 base case master files for NATO, SWA, and NEA were compared to the results of the excursions to reflect troop list changes. The printouts for each theater will be used to evaluate the force structure requirement differences resulting from the TOE availability factor changes. POC for further information is MAJ Barry V. Brassard, US Army Concepts Analysis Agency, AV 295-5270.

### **HIMAD Anti-Radiation Missile Survivability Analysis (HARMS)**

This study, sponsored by DAMO-FDE, provided detailed analyses of several different operational tactics to determine the impact on the survivability of the HAWK and Patriot missile systems, and their effect on overall Air Defense performance. The POC for further information is Ms. Pamela Roberts, U.S. Army Concepts Analysis Agency, DSN 295-5292.

### **Political-Military Game HORIZON 91 (HO-91)**

The Commander, Eighth U.S. Army (EUSA), requested that the U.S. Army Concepts Analysis Agency (CAA) conduct a political-military game focused on the role of U.S. Forces Korea in the Northwest Pacific after Korean unification. The Office of the Deputy Chief of Staff for Operations and Plans (ODCSOPS), Headquarters, Department of the Army (HQDA), cosponsored the game. The game, held at CAA on 9 January 1991, included GEN (Ret) John W. Vessey, Jr. and GEN (Ret) John A. Wickham, Jr., both former Commanders-in-Chief of the United Nations Command, who were later promoted to broader geographic responsibilities. The final report documents the numerous insights of the game, including that the U.S. has a continuing role to play in the region during any unification process and thereafter. The POC for further information is LTC Jeffrey A. Paulus, U.S. Army Concepts Analysis Agency, DSN 295-4715.

### **Homeward Bound Cost-Benefit Analysis (HOBOCOBA)**

The HOBOCOBA Quick Reaction Analysis (QRA), sponsored by ODCSOPS, HQDA, examines alternative policy options for the drawdown of U.S. Army units in the European theater. It analyzes the costs and benefits of unit reassignment versus unit inactivation (and reassignment of soldiers individually). It assesses effects on operational readiness and impacts on soldiers and families. It explores alternative options not initially considered by HQ USAREUR and HQDA. It assesses the assumptions and capabilities of an analytical model used by the U.S. Total Army Personnel Command (PERSCOM) to develop staff estimates for HQDA. A major limitation of the analysis was the concurrent execution of operation DESERT SHIELD, which invalidated many previous planning assumptions. The analysis concludes by noting the strengths and weaknesses of the various alternatives considered and by observing that none of the alternatives is clearly superior to the others. The POC for further information is Mr. G. Peery, US Army Concepts Analysis Agency, DSN 295-1609.

### **Improved Force Closure - Army Mobility Analysis (IFC-AMA)**

The IFC Quick Reaction Analysis (QRA), sponsored by ODCSOPS, HQDA, was conducted to support the Joint Improving Force Closure Working Group's response to the requirement of the Chairman of the Joint Chiefs to quantify

strategic lift requirements under two scenarios. This support consisted of developing movement requirement data bases for each scenario for subsequent analysis by the Joint Staff with its Model for Intertheater Deployment by Air Sea (MIDAS). Each data base contained unit records, at the Unit Identification Code (UIC) level, of the numbers of troops and quantities of equipment that would deploy with units on the scenario force. These data bases were delivered to DAMO-SSW on two magnetic tapes. The analysis director was MAJ Stafford Conley, and the POC for further information is Mr. Frank McKie, U.S. Army Concepts Analysis Agency, DSN 295-1082.

#### **Improved Force Capability Analysis, FASTALS (IFCA-FAS)**

IFCA-FAS, sponsored by the Office of the Chief of Staff for Operations and Plans (ODCSOPS), Headquarters, Department of the Army (HQDA), determines transportation requirements for the deployment of US forces to Saudi Arabia. This portion of the study, conducted by Forces Directorate, US Army Concepts Analysis Agency, specifically determined force totals for each functional area based on the combat unit list and deployment schedule provided by ODCSOPS. The Force Analysis Simulation of Theater Administrative and Logistic Support (FASTALS) Model was used to provide a time phased troop deployment list which includes combat, combat support and combat service support forces. The results of this portion of the study were provided to Strategy and Plans Directorate, US Army Concepts Analysis Agency, for the purpose of determining transportation requirements. POC for further information is MAJ Lee Colbert, US Army Concepts Analysis Agency, DSN 295-5269.

#### **Korean War Plans-Deployment Analysis (KOWAP-DA)**

KOWAP-DA examined options for future war plan contingencies in the Republic of Korea. Options considered included three different corps packages to respond to this contingency theater. KOWAP-DA analysis focused on the arrival profiles which could be anticipated from each of these corps package options. The closure dates provided input to the campaign simulations provided by the Concepts Evaluation Model (CEM). Emphasis was placed on ensuring full utilization of the lift, with no constraints as to availability of the unit for movement other than the availability dates at the port of embarkation (POE). Increased lift as available for the outyear resulted in most units meeting their desired closure dates. The POC for further information is CPT Elizabeth Vance, US Army Concepts Analysis Agency, DSN 295-0027.

#### **MAGELLAN 91 (MA91)**

The Office of the Deputy Chief of Staff for Operations and Plans (ODCSOPS), Headquarters, Department of the Army (HQDA), requested that the U.S. Army Concepts Analysis Agency (CAA) conduct a political-military game to examine political-military options for U.S. Army input into the Naval War College's

Global War Game and their relations to the Chief of Staff, Army, issues. The game, held at CAA on 24 June 1991, included most of the gamers selected to represent the Army at the Global War Game. It featured several briefings by key Army Staff members having direct responsibility for the issues. The final report documents the results of the game. The POC for further information is LTC Jeffrey A. Paulus, Strategy and Plans Directorate, US Army Concepts Analysis Agency, DSN 295-4715.

### **MARC Availability Factors (MARCFAC)**

The MARCFAC QRA was performed in response to a request from the US Army Force Integration Support Agency (USAFISA) to provide typical annual postures and movement information regarding combat, combat support (CS), and combat service support (CSS) units at various echelons in three theaters of operations--North Atlantic Treaty Organization (NATO), Southwest Asia (SWA), and Northeast Asia (NEA). The Concepts Evaluation Model (CEM) was used to provide the typical number of moves and the distance moved by the combat units in the three theaters, and the support unit data was extrapolated from the forward edge of the battle area (FEBA) movement report produced by CEM. Alternative rates of unit movement were provided based upon the Army Force Planning Data and Assumptions (AFPSA) movement rates used in the Force Analysis Simulation of Theater Administrative and Logistic Support (FASTALS) Model. POC for further information is Mr. Raymond G. McDowall, US Army Concepts Analysis Agency, DSN 295-5264.

### **Modernization Update, 1980-1990 (MOD-U)**

The MOD-U Quick Reaction Analysis (QRA), sponsored by the Office of the Deputy Chief of Staff for Operations and Plans (ODCSOPS), Force Readiness Division (DAMO-ODR), Headquarters, Department of the Army (HQDA), estimates the improvement in the Army's combat potential from 1980 thru 1990. The study methodology used the Analysis of Force Potential (AFP) model to determine combat potential of combat weapon systems. The main results of the analysis indicate the Army has improved 85 percent from 1980 thru 1990. The improvement in combat potential is based on inventory and force structure changes of divisions, separate maneuver brigades, and armored cavalry regiments from 1980 thru 1990. The analysis director is CPT(P) Edward Farnham, and the POC for further information is CPT Kevin Hammond, US Army Concepts Analysis Agency, DSN 295-5256.

### **Medical Planning Module - Casualties (MPS-CAS)**

The MPS-CAS quick reaction analysis, sponsored by the Deputy Chief of Staff for Operations and Plans (ODCSOPS), Headquarters, Department of the Army (HQDA), determined if the standard MPM SWA-specific casualty rates were appropriate for planning and resource allocation for Operation Desert Shield. The analysis methodology for validation of the existing MPM casualty rates included evaluation of the source scenario and historical data. Based on the

analysis, revised MPM casualty rates were developed and recommended which utilized the scenario and assumptions specific to Operations Desert Shield. The POC for further information is LTC James O. Kievit/LTC Linda L. Hampton, US Army Concepts Analysis Agency, DSN 295-5270.

### **Mobility Requirements Studies (MRS)\***

MRS, sponsored by the Office of the Chief of Staff for Operations and Plans (ODCSOPS) (DAMO-SSW), Headquarters, Department of the Army (HQDA) determines transportation requirements for the deployment of US forces to the Southwest Asia and Northeast Asia theaters. **\*MRS incorporates four QRAs under the same title. They are the MRC-E-C, MRC-EAST-B, MRC-WEST-C, and MRSSWA-DEX QRAs.\*** All were variations on the same theme. DAMO-SSW ultimately used other variations for the two theaters. Those QRAs are documented in memorandum reports. This portion of the study, conducted by Forces Directorate, US Army Concepts Analysis Agency, specifically determined force totals for each functional area based on the combat unit list and deployment schedule provided by ODCSOPS. The Force Analysis Simulation of Theater Administrative and Logistic Support (FASTALS) Model was used to provide a time phased troop deployment list which includes combat, combat support and combat service support forces. The results of this portion of the study were provided to Strategy and Plans Directorate, US Army Concepts Analysis Agency, for the purpose of determining transportation requirements. POC for further information is MAJ Lee Colbert, US Army Concepts Analysis Agency, DSN 295-5269.

### **Non-Negotiated Reduction Risk Assessment 90 (NRISK-90)**

The NRISK study was commissioned by the Conventional Arms Control Negotiation Division of Army DCSOPS, in November 1990. NRISK is part of the series of assessments that examined a range of operational variants in simulated campaigns in support of the Conventional Forces Europe (CFE) Treaty negotiation and ratification process. The study re-examined postulated CFE monitoring and verification thresholds to determine what constituted a military significant breach of the CFE Treaty by the Soviet Union. The re-examination was required as several NATO nations announced unilateral force reductions below CFE Treaty ceilings. The re-examination incorporated updated scenario assumptions, and projected NATO structure and force levels. The balance of these factors left NATO no more vulnerable than before to specific cases of 'cheating' represented in the original CONSTANT assessment. The author of study was LTC Dorn Crawford and the POC for more information is CPT(P) John S. Regan, US Army Concepts Analysis Agency, DSN 295-1057.

### **National Guard Structure Options (NSO)**

The NSO quick reaction analysis, sponsored by the Technical Advisor, Office of Deputy Chief of Staff for Operations and Plans (DCSOPS), analyzed four alternatives for restructuring and modernizing the Army's ten National Guard

divisions. Among the alternatives considered was an Army Staff proposal to deactivate four divisions and equip the remaining six with modern weapon systems. The study applied the Analysis of Force Potential (AFP) methodology to assess the combat potential of the forces in each alternative. The study concluded that the modernized six-division structure proposed by the ARSTAF will have higher combat potential than the ten divisions in their current configuration. The POC for further information is Mr. George Stoll, US Army Concepts Analysis Agency, DSN 295-5277.

### **Civilian Personnel Classification System (PERSYST)**

CAA participated in ODCSPER working group charged with preparation of a plan for the field test of the Automated Core Document (ADC) System. The system is used to prepare Army civilian personnel position documentation currently in three manually prepared documents. The system is microcomputer-based and uses menu-driven screens to prompt line supervisors and personnel specialists for position details. The plan provides for testing of the system at several MACOMs, as part of consideration of the use of the system Army-wide. The POC for further information is Mr. James Connelly, US Army Concepts Analysis Agency, DSN 295-0450.

### **Political-Military Game PILSONG I 90 (PS90)**

The Commander, Eighth U.S. Army (EUSA), requested that the U.S. Army Concepts Analysis Agency (CAA) conduct a Regional Area Assessment of Capabilities - Korea (RAACK) Study. PIL SONG I was a political-military game to examine limited-attack scenarios and command and control issues, in preparation for other, higher resolution modeling conducted for the study. The Office of the Deputy Chief of Staff for Operations and Plans (ODCSOPS), Headquarters, Department of the Army (HQDA), cosponsored the game. It was held at CAA on 9 October 1990, in conjunction with the GAMMA Corporation, and included GEN (R) Robert Sennewald, a former Commander-in-Chief in Korea. The final report documents the results of the game. The POC for further information is LTC Jeffrey A. Paulus, US Army Concepts Analysis Agency, DSN 295-4715.

### **Political-Military Game PILSONG 90-II (PS90-II)**

The Commander, Eighth U.S. Army (EUSA), requested that the U.S. Army Concepts Analysis Agency (CAA) conduct a Regional Area Assessment of Capabilities - Korea (RAACK) Study. PIL SONG II was a continuation of an earlier political-military game to examine limited-attack scenarios and command and control issues in preparation for other, higher resolution modeling conducted for the study. The Office of the Deputy Chief of Staff for Operations and Plans (ODCSOPS), Headquarters, Department of the Army (HQDA), cosponsored the game. Two games were conducted. It was conducted by CAA in Seoul, Korea on 29 and 30 November 1990 and included MG Eshelman (USMC), the CJ-5, BG Cha, ROKA, and other ROK and U.S. members of the combined staff. The final report documents

the results of the game. The POC for further information is LTC Jeffrey A. Paulus, US Army Concepts Analysis Agency, DSN 295-4715.

### **Secretary of Defense Option (SDOP)**

The SDOP quick reaction analysis, sponsored by the Deputy Chief of Staff for Operations and Plans (DAMO-FDF), determined the forces required to support the force specified in the Secretary of Defense's Option. In addition, the analysis examined the difference between the results of this analysis and the requirements developed in the Mini-Total Army Analysis study; and determined the support force requirements when cadre divisions are deployed. The POC for further information is COL Joseph Stull, US Army Concepts Analysis Agency, DSN 295-1262.

### **Vulnerability of SIGINT Vehicles Within the Context of Operation Desert Storm (SIGINT-STORM)**

SIGINT-STORM Quick Reaction Analysis (QRA), sponsored by the Director of Information Systems for Command, Control, Communications and Computers, is a comprehensive multiphase analysis of combat in the context of Operation Desert Storm. Measures of effectiveness include losses of major SIGINT equipment and other end items. The analysis is based on campaign results obtained with the Combat Sample Generator (COSAGE) and the Concepts Evaluation Model VI (CEM VI). POC for further information is Mr. Hugh W. Jones, US Army Concepts Analysis Agency, DSN 295-5251.

### **Stinger Threat-based Inventory Requirement - Fast Reaction Investigation (STIR-FRI)**

The STIR-FRI QRA was requested by MG William H. Forster, DAMO-FD, ODCSOPS and sponsored by COL Lewis J. Goldberg, DAMO-FDE, ODCSOPS. The study established a methodology to determine the requirement for the Stinger missile inventory based on a specific threat and including joint and allied contributions. This methodology was then used to examine two threat scenarios and to analyze the effect of these scenarios on the Stinger missile inventory. The POC for further information is Ms. Renee G. Carlucci, US Army Concepts Analysis Agency, DSN 295-5292.

### **Japan/Pacific TARO 91 Political-Military Game (TA91)**

The Commander, US Army Pacific (USARPAC), requested that the US Army Concepts Analysis Agency (CAA) conduct a political-military game to examine implications for the roles for US Army in the Pacific in the context of the Nunn-Warner reductions. The Office of the Deputy Chief of Staff for Operations and Plans (ODCSOPS), Headquarters, Department of the Army (HQDA) cosponsored the game. The game, held at Ft. Shafter, Hawaii from 23-25

September 1991, included all the principal members of the USARPAC staff, key action officers from the HQDA staff and Mr. Richard Halloran, Director of Special Projects, East-West Center, Hawaii and former news correspondent in Japan (1962-1976), and in the Pentagon (1979-1989). The final report documents the results of the game. The POC for further information is LTC Jeffrey A. Paulus, US Army Concepts Analysis Agency, DSN 295-4715.

### **Total Army Force Evolution Study II (TAFES II)**

The TAFES II study, sponsored by the Deputy Chief of Staff for Operations and Plans, Headquarters, Department of the Army, was focused on the European theater force requirements. The TAFES II study updated an earlier study by incorporating recent events in the European environment. The Concepts evaluation model (CEM) was used to simulate Central European conflict using the Joint Chiefs of Staff scenarios. The results of the simulations were used to determine the requirement for major U.S. Army above the line forces for Allied Forces Central Europe (AFCENT) and to determine the active reserve component mix for these units. The POC for further information is Mr. Louis J. Albert, US Army Concepts Analysis Agency, DSN 295-1526.

### **Total Army Force Evolution Phase II- Mobility Analysis (TAFES II-MA)**

The Total Army Force Evolution Phase II- Mobility Analysis was conducted for the Office of the Deputy Chief of Staff for Operations and Plans (ODCSOPS). TAFES II-MA examines the strategic mobility impact of alternative Reserve Component (RC) force design options and levels of readiness for RC divisions and brigades on North Atlantic Treaty Organization (NATO) force closure profiles within the context of the Europe A/B scenario, fiscal year 99-01. Closure estimates were determined using CAA's TRANSMO. The POC for further information is MAJ Robert G. Albrecht, Jr., Mobilization and Deployment Division, Strategy and Plans Directorate, US Army Concepts Analysis Agency, DSN 295-1657.

### **Vice Chief of Staff of the Army - Controlled Munitions (VCSA-CLV)**

VCSA-CLV Quick Reaction Analysis (QRA), sponsored by the Office of the Deputy Chief of Staff for Operations and Plans (ODCSOPS), Headquarters, Department of the Army (HQDA), is a comprehensive multiphase analysis of combat in the context of Operation Desert Shield. Measures of effectiveness include combatant casualties and permanent losses of major end items. The analysis is based on campaign results obtained with the Concepts Evaluation Model VI (CEM VI). The analysis director was CPT Jeffrey A. Appleget and the POC for further information is LTC Charles Shelton, US Army Concepts Analysis Agency, DSN 295-1588.



## **Other Publications**

### **Combat Modeling and the AirLand Battle-Past, Present, and Future (COMALB)**

COMALB is a research paper which chronicles the CEM modeling of Desert Storm within the framework of AirLand Battle-Future Doctrine. The paper's main focus is on the adaptability of the CEM model. Desert Storm was a classic example of the evolving AirLand Battle-Future doctrine, and the CEM model was able to simulate this doctrine without any coding changes. Featured in the paper are many examples of the innovative techniques and unique capabilities of the CEM model that allowed CAA's analysts to model Desert Storm successfully. The analysis director was CPT Jeffrey A. Appleget and the POC for further information is LTC Charles Shelton, US Army Concepts Analysis Agency, DSN 295-1588.

### **Global Force Allocation Model (GLOFAM)**

GLOFAM is a rapid-reaction, macro-level, desk-top planning model designed to complement more-detailed, higher-resolution models. It was developed to address a perceived need for an analytical tool to support planning within the revised and dynamic demands of the current and future international security environment. GLOFAM provides the planner with an allocation of forces by unit type and number to respond to a specified threat at a desired level of force ratio. Parameters of the scenario are described in terms of warning time, lift capacity, reserve availability, degree of readiness, state of weapons modernization, terrain characteristic, allied forces and forward-deployment. Theaters may be addressed either in isolation or in combination. Relative importance of each theater to the national security is quantified. A linear program is used to rapidly delineate macro level force planning alternatives. Variables, parameters, and constraints are interchangeable. Sensitivity analysis can be employed to ascertain a range of viable solutions. Higher resolution models may then be applied to provide greater definition to the choice of alternative. This synergistic relationship can quickly bring into focus the preferred force design. Attendant to the output of force configuration are support forces, cost of the deployable force, and end strength. The model's key features are speed, transparency, and flexibility. The analysis director was MAJ John Dovich, the POC for further information is COL Larry Lovell, US Army Concepts Analysis Agency, DSN 295-1698.

### **Low Intensity Conflict Analysis Workshop (LICAWS)**

A Low Intensity Conflict Analysis Workshop, cosponsored by Concepts Analysis Agency and the Army-Air Force Center for Low Intensity Conflict, was held 6-7 June 1991 at CAA. Workshop focus was on the analysis of LIC. The purpose

was to develop a statement of Army analytic needs to support LIC decision-makers. Objectives were to identify LIC issues, analytic requirements, and produce insights into LIC analysis. It is difficult to define LIC issues to be analyzed. Analysis and models should focus on LIC operational categories or type operations. LIC issues need to be organized by strategic, operational, and tactical levels. LIC is an interagency endeavor, but our analysis must focus on the Army responsibilities. We must create a pre-crisis database identifying the "steady state." Senior level mainstream decision-maker and analyst involvement is necessary. Incorporate LIC analysis into the AR 5-5 and CBRS processes. The POC for further information is LTC Harry Golding, US Army Concepts Analysis Agency, DSN 295-1708.

### **Stochastic Concepts Evaluation Model (STOCCEM)**

The STOCCEM Research Analysis Activity, sponsored by the Director, CAA, develops a stochastic version of the Concepts Evaluation Model (CEM), with decisions, attrition calculations, and certain other functions based on statistical distributions rather than on expected values of CEM. The basic approach used in this work is: establish a deterministic simulation of the Ardennes Campaign of December, 1944, as a baseline; develop stochastic versions of the CEM; apply each version of stochastic CEM to conduct a set of CEM replications with the baseline. The principle findings of this analysis are as follows. (1) In the cases examined, certain CEM outcome measures, such as the distance advanced by maneuver forces, the loss exchange ratios and fractional loss exchange ratios, and the posture frequencies, exhibited large variation among stochastic replications of the same simulated campaign; other outcome measures, such as equipment losses, personnel casualties, and ammunition consumption, showed little variability among stochastic CEM replications. (2) In the cases examined here, for many CEM outcome measures the result of the deterministic CEM is apparently different from the expected value of the stochastic CEM replications. (3) This work demonstrates the feasibility of executing multiple replications of a stochastic simulation of a theater campaign. The POC for further information is Dr. Ralph Johnson, US Army Concepts Analysis Agency, DSN 295-1593.

### **Theater Studies Process -- Analysis and Documentation (TSPAD)**

TSPAD, sponsored by the Chief, Theater Force Analysis Division, Forces Directorate, US Army Concepts Analysis Agency (CAA) provides a detailed analysis of the theater studies process and documents it in order to facilitate planning, managing of studies, and to serve as a training vehicle for analysts in the Theater Force Analysis Division. The basic approach was to represent the major tasks to be accomplished in the theater study process as five phases. These phases are (1) preparation and planning, (2) build data base, (3) execution and analysis, (4) document, and (5) publish. Once defined, these phases were further decomposed into smaller modules, and a flow diagram of the process was generated. Data base software was used to transfer the process to the personal computer. The Harvard Total Project Manager II (HTPM II) was designated as the tool for generating Program Evaluation Review Techniques (PERT) and milestone charts that facilitates the

training of new analysts to the directorate. The principle findings indicate that the current theater studies process is adequate for performing force analyses at CAA and that the use of a systematic approach to the theater studies process that has been sufficiently documented allows for greater flexibility, transportability, and continuity of knowledge among analysts and facilitates study management. This study assumes that analysts possess a working knowledge of HTPM II and the TSPAD data base software. The POC for further information is Ms. Rosie H. Brown, US Army Concepts Analysis Agency, DSN 295-5301.

## CHAPTER 4

### TECHNOLOGY RESEARCH AND ANALYSIS SUPPORT

#### 4-1. TECHNOLOGY RESEARCH.

**General.** CAA's Advanced Research Project Office (ARPO) has a threefold mission: to identify and evaluate advanced technologies and methodologies for potential applicability to the CAA mission; provide consultation on high technology subjects; and develop and execute an applied research program. During FY 91, ARPO pursued a variety of investigations and development efforts aimed at leveraging advanced technologies and methodologies. The major projects are summarized below.

**Generic Application of Blackboard Yoking (GABY).** GABY was a research project to investigate application of specific knowledge-based techniques to command and control (C2) modeling. The GABY Evaluation project accomplished this year concluded that the methods used in GABY have potential to enhance C2 representation. However, these techniques are best introduced in the initial design and development phases of a model. Retrofitting an existing model is not likely to be successful.

**The Study Director's Advisor (SDA).** CAA developed the SDA to serve as an automated tool for tutoring and guiding study directors and study team members during all phases of conducting and managing an analytical effort. The SDA was expanded and, through the use of Spinnaker's Plus, ported to the IBM PC-compatible computers.

**Structured Approaches to the Concepts Evaluation Model (CEM).** Efforts during the past year involved vectoring the Attrition Calibration (ATCAL) Model algorithm in a standalone version. CEM run time was decreased by a factor of 8. This work was accomplished by Dr. Pat Burns and Mr. Michael Brewer of Colorado State University. The work will continue with testing of the vectored ATCAL embedded in CEM to determine overall decrease in model run time.

**High Performance Computing.** CAA, a remote site for the Army High Performance Computing Research Center (AHPCRC), has been working with AHPCRC to examine the portability and performance of CAA's models on a variety of new and emerging computer architectures. Results on three different super-scalar uniprocessing workstations were equal to the parallel processing computers of 2 years ago. The fact that the software was not developed for parallel processing contributes to the very favorable comparison of the uniprocessing systems.

**Object-oriented Data Base Development.** Two efforts were initiated this year. The first involves development of a data base from a variety of files to generate force files. Investigation into the METAPHOR environment is ongoing. The second data base effort involves storing and analyzing the CORBAN model output. The intent is to accumulate statistics on the sets of runs to determine when individual runs are outside the expected norms.

**Artificial Intelligence and Simulation in Modeling Complex Systems.** CAA cosponsored the Workshop on Artificial Intelligence and Simulation in Modeling Complex Systems. Faculty from many universities presented papers on research into advanced technology issues. Army speakers included The DUSA(OR) and the Director, CAA.

#### **4-2. TECHNICAL SUPPORT.**

**General.** Technical support for Agency activities is categorized into three areas: model development, enhancement, and configuration management; statistical analysis support for studies; and automation (hardware and software support).

##### **Analytical Models.**

**General.** CAA uses a wide variety of simulations, models, and special purpose ADP systems to accomplish its study program. These tools, often referred to collectively as models, range from simple spreadsheets and data processing systems to complex simulations of theater combat. The following paragraphs describe some of CAA's modeling efforts over the past year. For additional description of the nature of these models, see Appendix D.

**Concurrent Theater-level Simulation (CTLS).** This parallel processing, theater combat model development effort continued with the addition of close air support (CAS), expanded command and control, and new maneuver network processing. The MORS CTLS paper was nominated for best paper. In addition, the Time Warp Operating System was selected By R&D Magazine as one of the top 100 R&D projects in the US.

**Concepts Evaluation Model (CEM).** Major work was accomplished in several areas:

Stochastic versions of the model were developed and tested, and a paper on the subject was presented at AORS. Work continues to investigate and experiment with the stochastic concept.

The model was modified to represent the effects of deep attack. Arriving divisions can be delayed and subjected to attack. A separate killer/victim attrition board was added for deep attack.

Several other modifications were made: accounting for crews of damaged vehicles as captured or missing in action (MIA), reduction of aircraft sortie rates due to bad weather, additional reports to support the casualty stratification analysis.

**Force Evaluation Model (FORCEM).** Many enhancements were made to this model to provide the user with additional, more detailed information. Examples of additional outputs are: nonreparable combat losses, permanent kills, personnel losses by cause, nuclear effects, asset tracking by time period. The Output Reports documentation was updated and distributed. In addition, model logic modifications were made to the movement calculations, engagement fractions, and mission oriented protection posture (MOPP) transition factors.

**Combat Sample Generator (COSAGE).** Modeling of collateral damage due to high explosive (HE) munitions and improved conventional munitions (ICM) was completed, tested, and incorporated into the operational model. In addition, the modeling of collateral damage was extended to precision guided munitions such as search and destroy armor (SADARM).

**Corps Battle Analyzer (CORBAN).** This modeling effort was focused on supporting the Value Added Study. The deterministic version of the model was installed on the SUN system, and appropriate versions for the three theaters were created. Pre- and postprocessors were installed and modified to meet study needs. Run procedures and command files were created to permit the running of the model concurrently on a number of different workstations. Command procedures were also created to efficiently compress and archive the outputs from the Value Added runs.

**Transportation Model (TRANSMO).** A quick response version of the model was created. This version, which provides for rapid data setup and fast execution, is installed on the Macintosh microcomputer. The detailed model, operational on the UNISYS, has been enhanced in the representation of air traffic scheduling and the representation of the effects of canal operations and closings.

**Statistical Analysis Support.** CAA's mathematical statisticians provided Agency-wide support in the areas of experimental design and statistical analysis. Specific studies supported this year include: CASMO-VAL, SOVA, Value Added, and Stochastic CEM. Also an analysis of relative precision versus sample size for the CORBAN Model was completed.

**Automation (Hardware and Software).** The goal for the Agency is an environment in which a network of workstations located within the Agency can access the more powerful computers located within CAA and at remote sites.

Progress toward this goal has been constrained due to the severe impact of limited funds. The following actions were taken to enhance the CAA computing environment:

Acquisition of:

- 5 Xerox (SUN) SPARC workstations
- 35 "GlobalView for PC" upgrades for the microcomputers
- 23 80386 processor upgrades for Zenith PCs
- 1 QMS 100 color printer

Installation of a secondary "unclassified" network to connect to Internet (ARPANET) and the Cray X/MP at BRL.

Alternative computing solutions continue to be investigated. The addition of RISC-type machines for specific models is being considered and funding sources are being sought. The 11-year-old UNISYS mainframe is slated for replacement as soon as an acceptable alternative can be identified and funded.

## CHAPTER 5

### MISSION AND MANAGEMENT SUPPORT

#### 5-1. ORGANIZATION AND PERSONNEL.

- Organization/TDA.

- Structure.

In December 1990, the Agency's Division Operations Center was transferred from Requirements Directorate (RQ) to Forces Directorate (FO) to more closely align division- and theater-level analysis. This involved the movement of three military positions and seven civilian positions from RQ to FO.

The TQM Specialist's position was created under the Deputy Director.

The Advanced Planning and Integration Office was created under the Deputy Director for Strategic Analysis. Three positions were reassigned from Strategy and Plans Directorate to form this new office.

- TDA. CAA's current TDA was approved in January 1991 with an effective date of 1 October 1990. This TDA reflected the loss of all but one enlisted position within the Agency. The Agency's share of the QUICKSILVER cuts was 18 civilian positions effective 1 October 1991. However, the scheduled Management of Change (MOC) Window for documenting these cuts was delayed.

- Hiring Freeze. The HQDA hiring freeze was extended through CY 91. A program was initiated to allow organizations to hire two personnel from outside DOD for every five personnel who retire, resign, or leave for positions outside DOD.

- Personnel Strength. FY 91 personnel end strengths by quarter were as follows:

#### CIVILIAN FULL TIME PERMANANT

<u>QUARTER</u>	<u>AUTHORIZED</u>	<u>ASSIGNED</u>
1	179	157
2	179	156
3	179	156
4	179	154
AVERAGE	179	156

## MILITARY

<u>QUARTER</u>	<u>AUTHORIZED</u>				<u>ASSIGNED</u>			
	<u>OFF</u>	<u>WO</u>	<u>ENL</u>	<u>TOT</u>	<u>OFF</u>	<u>WO</u>	<u>ENL</u>	<u>TOT</u>
1	83	0	1	84	78	1	8	87
2	83	0	1	84	78	1	8	87
3	83	0	1	84	83	1	8	92
4	83	0	1	84	81	1	5	87
AVERAGE	83	0	1	84	80	1	7	88

## COOPS

<u>QUARTER</u>	<u>ASSIGNED</u>
1	12
2	5
3	6
4	7
AVERAGE	8

### ● Reorganizations.

The Army Analysis Requirements for the Nineties (AAR-90) portion of the Army VANGUARD Study addressed the role and organization of the Army's analysis community for the decade of the 1990s. As a result of VANGUARD Study recommendations, the Vice Chief of Staff of the Army issued a directive on 23 September 1991 to restructure and realign the Army Analysis Agencies. Within the Army's restructured analytical framework, CAA was designated the Army's Center for Strategy and Force Evaluation, and its role was expanded to link strategic assessments and political considerations with CAA's traditional areas of military operations research analysis.

Over the past few years, CAA had been evolving its organization in response to staffing reductions and its increasing role in the areas of dynamic planning and combat analysis, strategic assessments, and political/military wargaming. In response to the VCSA's VANGUARD decisions and his challenge for increased efficiency, the Director, CAA implemented the following additional organizational changes to realign the Agency for its expanded analysis role:

- The Forces Directorate and Requirements Directorate were disestablished.

- The Office of Special Assistant for Operational Capability Assessments (SAOCA) was established with the primary mission to conduct continuing assessments of the capabilities of current forces for HQDA and for Army Components of Unified Commands. COL Arthur E. Parker III was assigned as the SAOCA. SAOCA staffing of nine spaces was derived from the disestablished FO directorate.



- The Force Evaluation Directorate (FE) was established with the mission to evaluate the Army's total capability to prepare for, conduct, and sustain war. COL James O. Vance was assigned as the AD, FE. FE staffing was derived from the disestablished RQ directorate, less the Nuclear/Chemical Division (RQN) which was transferred to Strategy and Plans Directorate (SP) and the FO personnel not assigned to SAOCA or SP.

- The Nuclear/Chemical Division of the disestablished RQ Directorate was transferred to SP and renamed the Nuclear, Biological, and Chemical (NBC) Division. This organizational realignment was accomplished to improve the analysis and integration of nuclear, biological, and chemical issues with strategic and operational assessments and did not alter the basic mission of the division.

### ● Awards and Recognition.

- **Army Study Highlights (ASH).** Three CAA studies were recognized for their excellence by publication in Volume XI of Army Study Highlights. They were:

<u>Study title</u>	<u>Study director</u>
Rates of Advance in Historical Land Combat Operations	Dr. Robert L. Helmbold
Armored Systems Modernization-	MAJ Eric J. Coulter
Multicorps Sustained Operations Analysis	
NATO 2000	CPT Eric E. Stebbins

On 17 September 1991, CAA nominated two studies for publication in the upcoming edition of the Army Study Highlights (Volume XII). These were:

<u>Study title</u>	<u>Study director</u>
POMCUS Unit Siting Alternatives	Mr. J. Theodore Ahrens
Counter-Drug: Mandate for the Army	LTC C. Harry Golding

- **HQDA Systems Analysis Award.** The following two CAA studies were nominated in August of 1991 to receive the Wilbur B. Payne Memorial Award in the indicated category. At this writing, a selection has not been made.

<u>Individual Award</u>	<u>Group Award</u>
Strategic Deployment Analysis Review Study	Contingency Operations Southwest Asia

- **Study Directors' Luncheon.** CAA held this annual luncheon on 13 November 1990 to honor individuals who served as directors of studies and other analytical efforts completed during FY 90. The guest speaker was Mr. Keith Myers, Director, US Army Materiel Systems Analysis Activity, Army Materiel Command. Certificates of Achievement were awarded to individuals who had directed a total of 73 studies and quick reaction analyses; Certificates of Accomplishment were awarded to individuals who had directed a total of 26 projects and research and analysis activities. These 99 awards were received by a total of 63 individuals.

- **The Director's Award for Excellence.** The 18th Annual Dinner Dance was the venue chosen for presenting this award. On 9 March 1991, the Director hosted this annual event with MG(Ret) Edward B. Atkeson as his special guest and after dinner speaker. The following individuals received this award in the category indicated:

<u>Name</u>	<u>Category</u>
Ms. Nancy Lawrence	Individual Support
Dr. Robert L. Helmbold	Individual Analyst
COL Arthur E. Parker III	Individual Analyst
COSWA Analyst Team:	
LTC Charles Shelton	Task Force Leader
Mr. Glenn Stockton	Team Member
CPT Jeffrey Appleget	"
Mr. Hugh Jones	"
CPT Daniel Russell	"
Mr. David Smith	"
CPT David Knudson	"
Mr. John Tucker, Jr.	"
CPT Michael Rizzio	"
Mr. Ronald Bonniwell	"
CPT Stephen Ford	"
Mr. Neal Siegel	"
Mr. Jeffrey Hall	"

- **Performance Awards.** Budgetary constraints limited the number and monetary value of civilian performance awards during FY 91. CAA's Desert Shield/Storm participation resulted in numerous impact awards to CAA military personnel. Awards were made as follows:

QSI	PA	<u>CIVILIAN</u>		SES	TOT	LOM	<u>MILITARY</u>			AAM	TOT
		SA	GM				MSM	ARCOM			
3	42	7	11	1	64	6	9	18	6	39	

● **Visiting Analyst Program.** Dr. Richard Darilek of RAND Corporation served as the Distinguished Visiting Analyst to CAA from August 1989 through March 1991. During this period, he served CAA as a member of the Analysis Review Board (ARB), successfully directed the NoReds Study, and provided analytical assistance and expertise in the conduct of several other CAA studies. His intricate knowledge of foreign military affairs contributed measurably to several important studies which completed by CAA during FY 91.

#### 5-2. FY 91 BUDGET.

● **FY 91 Operating Budget.** A recap of the Agency's budget execution is provided below. CAA's annual direct funding obligation rate was 98.3%.

BUDGET CATEGORY	OBLIGATIONS \$000		
	Direct Funding (Recurring)	External (Non-recurring)	Total
Civilian Compensation	8,871.5	18.3	8,889.8
Travel	116.1	4.7	120.8
Training	144.5		144.5
Maintenance	1,567.1		1,567.1
Supply and Equipment	368.0	13.9	381.9
Software Development	213.3	883.1	1,096.4
Study Support	525.0	174.9	699.9
Communications	243.6		243.6
Security	318.5		318.5
Services & Leases	91.0		91.0
Facilities Improvement	34.6		34.6
TOTAL OBLIGATED	12493.2	1,094.9	13,588.1
TOTAL ALLOCATED	12737.0	1,136.3	13,873.3

• **Budget Issues.** CAA's annual funding program was tenuous and uncertain throughout FY 91 due to Operations DESERT SHIELD/STORM and anticipated force reductions. CAA's total annual operating budget was not confirmed until June 91. CAA received additional funding of \$675K on 5 Sep 91 to pay bills for BRL supercomputer usage and to support personnel awards and late-year supply actions.

### 5-3. SECURITY.

• **Orientation and Training.** The CAA Security Office conducted two information security program briefings; one security presentation for the CAA Newcomers' Orientation class; the annual NATO security access briefing; and FY 91 SAEDA briefings to all Agency personnel.

• **Inspections.**

- The annual NATO security inspection was conducted by the Office of the US Central Registry, NATO, during Oct 90, and no major discrepancies were noted.

- In-house security inspections conducted by CAA's Security Office during Feb-Mar 91 revealed minor discrepancies which were corrected.

- The Physical Security inspection was conducted by the MDW Physical Security Team during Jun 91, and no discrepancies were noted.

- The biannual inspection of JCS documents conducted by the CAA Security Office in Jul 91 revealed no discrepancies.

**5-4. COOPERATIVE EDUCATION PROGRAM (CO-OP).** The Cooperative Education Program had 10 active participants either attending school or working at CAA as of 1 October 1991. Eight of these Co-ops were scheduled to report to CAA to complete their 120-day work obligation period in FY 92. However, due to budget reductions, these individuals have been informed that they have been

relieved of this obligation and will not be returning to work at CAA. These eight Co-ops will remain on a LWOP status for their 120-day payback period. If they find federal employment within the 120-day timeframe, there will not be a break in their service. The cessation of the Co-op Program at CAA has begun.

## 5-5. LOGISTICS.

### ● Building Renovations.

Major renovation of the Woodmont and Rugby buildings was completed in FY 91. Work included painting and installing new carpet, lighting, and a sprinkler/fire alarm system.

An automatic on/off device for the sprinkler system was installed in the computer rooms on 6, 7, and 8 Woodmont to prevent the sprinklers from activating before the power is turned off.

### ● Equipment.

Unclassified facsimile machines were procured and installed in the Command Group, SP, FS, FO, and Security Office. The unclassified facsimile in the mail room was moved to Room 915B. A new classified fax was ordered to replace an old model that could not be repaired. This has given the Agency additional capability for responsive communication with other agencies.

Responsibility for Agency vehicles was transferred from the Human Resources Division to the Resource Management and Logistics Division. Policy on employee reservation and use of Agency vehicles for official business was developed and disseminated.

## 5-6. CONTRACTS.

### ● Awards. Major contract efforts awarded in FY 91 were:

- II. (1) Completion of the Global Deployment Analysis System (GDAS) Phase
- (2) Next Generation (NXG) Wargame Development contract.
- (3) Value Added Analysis (VAA) methodology development on the METAPHOR computer.
- (4) Purchase of a RISC 6000 machine for the Agency.

● **Budget Review.** Maintenance contracts were reviewed in FY 91 to determine what contracts could be eliminated or reduced due to budget cuts. Contracts approved for cancellation were the Superset, RAMTEK, and Hetra maintenance efforts. Other equipment and software maintenance contracts are being reviewed to reduce costs by eliminating obsolete and low-utilization items.

## 5-7. PUBLICATIONS, REPRODUCTION, AND GRAPHICS.

- **Equipment and Facilities.** No major equipment changes were made in any of the centers during the fiscal year. Training of personnel on use of the Macintosh computer was completed. Existing equipment continues to meet Agency support needs.

- **Publications.** During the year, the Publication Support Branch (PSB), consisting of the Publications Center, Graphic Arts Center, and Reproduction Center, assisted in the preparation, publication, and dissemination of 37 major Agency reports and 63 quick reaction analyses (memorandum reports). Graphic Arts projects included preparation of special displays for the MORS Symposium, Human Dignity Council, Federal Women's Program, Association of the US Army, Black History Month, Holocaust - Days of Remembrance, and numerous other special functions.

- **Reproduction.** Workload in the Reproduction Center totaled more than 1,660,000 impressions associated with 2,892 individual job completions. In addition to the routine workload, reproduction support was provided to the special team working on DESERT SHIELD/STORM Lessons Learned After Action Report. This report consisted of three volumes totaling more than 2,000 pages.

- **Process Improvements.** A second process review of the entire publication process was conducted in an attempt to further streamline procedures. Results of this review were briefed to the Analysis Review Board on 2 October 1991. The TQM Specialist is to further review the process to ascertain if further refinements can be made.

- **Transfer of CAA's Reproduction Function.** The Agency was informed in September 1991 that the reproduction function was to be consolidated into the newly formed Defense Printing Service effective 1 October 1991. However, at the present time, this consolidation has been put on hold until further notice (for approximately 30-60 days) while GAO reviews the proposed consolidation.

## CHAPTER 6

### ANALYTICAL EFFORTS COMPLETED BETWEEN 15 JAN 73 THROUGH FY 91

This chapter contains a listing of titles of all analytical efforts completed by CAA from 15 Jan 73 through the end of FY 1991.

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ANALYTICAL EFFORTS COMPLETED BETWEEN 15 JANUARY 1973  
THROUGH FISCAL YEAR 1991

ACRONYM	TITLE	PROPONENT
- FY 91 Studies and Contracts		
A2D2P2	Anti-Armor Defense Data, Phase II	CAA
ARIM	Army Resource Integration and Management	DCSOPS
ATVAL	ATCAL Evaluation	CAA
CHEMPHASE	Chem Protection Hazard Assessment in Europe Study	DCSOPS
CMA	Counter-drug: Mandate for the Army	DCSOPS
DSSLL	Desert Shield Strategic Lessons Learned	DCSOPS
DYNAFOR	Accessions Forecasting for Dynamic Force Structures	DCSPER
EMPDA	Enhanced Massively Parallel Deployment Analysis	DUSA-OR
ETRANS	European Transportation Requirements for Backhaul of Personnel/Cargo	DCSLOG
FES	Force Employment Study	DCSOPS
FASTAUTO	FASTALS Automation Contract	CAA
IMAM	Information Management Modernization Study	DISC4
IV&V FORCEM C2	IV&V FORCEM C2 Module	CAA
IV&V GDAS II	IV&V Global Deployment Analysis System, Phase II	CAA
IWAS-EC	Initial Wartime Army Support-Effectiveness & Capability	DCSLOG
LRAMRP	Long Range Army Materiel Requirements Plan Study	TRADOC
MARTEP	Maritime Terminal Evaluation Program	DCSLOG
NATO 2000V	NATO 2000 Appendix	DCSOPS
OMNIBUS-91F	Operational Readiness Study FY-91 (FORCEM)	DCSOPS
POMCUSITE	POMCUS Unit Siting Alternatives Study	USAREUR
PROBATIONS	Probabilistic Foundations for a Fully Stochastic Theater-Level Ground Combat Simulation	CAA
RACCK	Regional Assessment Combat Capability-Korea	EUSA
RACCK-CALAPER	Regional Assessment Combat Capability-Korea, Calculation of Ammo, Petroleum and Equipment	EUSA
RACCK-CHEM	Regional Assessment Combat Capability-Korea, Chemical Analysis	EUSA
RACCK-DA	Regional Assessment Combat Capability-Korea, Deployment Analysis	EUSA
RACCK-FASTALS	Regional Assessment Combat Capability-Korea - FASTALS	EUSA
SCALED II	Simple Combat Attrition Law Evaluation Data, Phase II	DUSA-OR
SOVA	Soviet Air Operation Analysis Study	DCSOPS
SRA-99	Support Force Requirements Analysis - 1999	DCSOPS
STRADER	Strategic Deployment Analysis Review Study	DCSLOG
TACNUC	Theater Analytic Nuclear Model	DCSOPS
TWVMU	Tactical Wheeled Vehicle Modernization Update	DCSOPS
VALUE ADDED	Value Added Analysis 90-97	PAE



## - FY 91 Quick Reaction Analyses

AAMU	Army Aviation Modernization Update	DCSOPS
AAMU-SR	Army Aviation Modernization Update-Scout Relook	DCSOPS
ALF-1	Airlift Force Study	VCSA
ARVIS-DA	Army Vision Deployment Analysis	DCSLOG
BA91	Political-Military Game BALBOA 91	USARSO
CADAVR	CORBAN Air Defense Artillery Validation & Review	PAE
CASIO	Chemical Attacks Against Contingency Staging Areas	DCSOPS
CMMS II-CO	Congressionally Mandated Mob Study II-CINC Options	DCSLOG
CMMS-NATO	Congressionally Mandated Mobility Study, NATO	DCSOPS
CMMS-NEA	Congressionally Mandated Mobility Study, NEA	DCSOPS
CMMS-SWA	Congressionally Mandated Mobility Study, SWA	DCSOPS
CMMS2-AMD	Congressionally Mandated Mobility Study 2, Army Mobility Data	DCSOPS
CORCFE	CORBAN Centralized Forces Europe	PAE
COSWA-AF-MEA	COSWA-Alternative Forces - Munition & Equipment Analysis	DCSOPS
COSWA-AIM	COSWA - Air Interdiction Maneuver	DCSOPS
COSWA-ALT	COSWA - Alternative Contingencies	DCSOPS
COSWA-DCAS	COSWA - Division Casualty Stratification Analysis	DCSPER
COSWA-RAN	COSWA - Requirements Analysis	DCSOPS
COSWA-RES	COSWA - Residual Force Requirements	DCSLOG
COSWA-SPT	COSWA - Supportability Analysis	DCSOPS
COSWA-STK	COSWA - Stockage	DCSOPS
COSWA-STK-MEA	COSWA - Stockage - Munitions & Equipment Analysis	DCSOPS
COSWA-SUM	COSWA - Summary	DCSOPS
COSWA-SUM-UP	COSWA - Summary Update	DCSOPS
COSWA-SUMFOR	COSWA - Summary FORSCOM	DCSOPS
COSWA-SUPAN	COSWA - Support Analysis	DCSOPS
COSWA-XAIR	COSWA - Extended Air Operations	DCSOPS
COVARA	Cost Variability Analysis	USASAC
CPOST	Post-CFE Posture Assessment	DCSOPS
CRISK	CFE Circumvention Risk Assessment	DCSOPS
DAIRICOWS	Detailed Analysis/Invest. of Resource Items & Costs of Weapon Systems	DCSOPS
DESERT RAMP	Desert Ramp (There is no summary for this)	DCSOPS
DSAD-FROG	Desert Shield Air Defense-Free Rocket Over Gound	DCSOPS
DSAD-PS	Desert Storm Air Defense Patriot Stockage	DCSOPS
DSAW-ATEMS	Desert Shield Air Warfare-ATACMS Employment	DCSOPS
DSAW-EAD	Desert Shield Air Warfare-Extended Air Defense Analysis	DCSOPS
DSAW-IUD	Desert Shield Air Warfare-Israeli Urban Defense	DCSOPS
DSCA I	Desert Storm - Campaign Analysis I	DCSOPS
DSCA II	Desert Storm - Campaign Analysis II	DCSOPS
DSCA III	Desert Storm - Campaign Analysis III	DCSOPS
DSCA IV	Desert Storm - Campaign Analysis IV	DCSOPS
DSCA V	Desert Storm - Campaign Analysis V	DCSOPS
DSLL	Desert Shield Lessons Learned	DCSOPS
ETRANS-FOS	European Transportation - Roundout Support	DCSLOG

FLOATPOM	Floating POMCUS Analysis	DCSLOG
FOD-FDAT	Forward Deployed Force Alternative	VCSA
FOMOSA	Force Modernization Sensitivity Analysis	DCSOPS
FORR-MAN	Force Regeneration/Reconstitution-Mobility Analysis	DCSOPS
GE-TAR	Global Excursion of Transportation Allocation Rule	TRADOC
HARMS	HIMAD Anti-Radiation Missile Survivability Analysis	DCSOPS
HO-91	Political-Military Game Horizon 91	EUSA
HOBOCOBA	Homeward Bound Cost-Benefit Analysis	DCSOPS
IFC-AMA	Improved Force Closure - Army Mobility Analysis	DCSOPS
IFCA-FAS	Improved Force Capability Support Analysis	DCSOPS
KOWAP-DA	Korean War Plans - Deployment Analysis	EUSA
MA91	MAGELLAN 91	DCSOPS
MARCFAC	MARC Availability Factors	USA FISA
MOD-U	Modernization Update, 1980-1990	DCSOPS
MPM-CAS	Medical Planning Module - Casualties	DCSOPS
MRC-E-C	Mobility Requirements-Major Regional Conflict, East, Case C	DCSOPS
MRC-EAST	Mobility Requirements Study-Major Regional Conflict, East, Case B	DCSOPS
MRC-WEST	Mobility Requirements Study-Major Regional Conflict, West, Case C	DCSOPS
MRSSWA-DEX	Mobility Requirement Study Southwest Asia, Case D	DCSLOG
NRISK-90	Non-Negotiated Reduction Risk Assessment 1990	DCSOPS
NSO	National Guard Structure Options	DCSOPS
PERSYST	Civilian Personnel Classification System	DCSPER
PS90	Political-Military Game PilSong 90	EUSA
PS90-II	Political-Military Game PilSong 90-II	EUSA
SDOP	Secretary of Defense Option	DCSOPS
SIGINT STORM	Vulnerability of SIGINT Vehicles Within the Context of Operation Desert Storm	ISC
STIR-FRI	Stinger Threat-based Inventory Requirement-Fsst Reaction Investigation	DCSOPS
TA91	Japan/Pacific TARO Political Military Game	USARPAC
TAFES-II	Total Army Force Evolution Study II	DCSOPS
TAFES II-MA	Total Army Force Evolution Study II - Mobility Analysis	DCSOPS
VCSA-CLV	VCSA Controlled Munition Assessment	DCSOPS

# - FY 90 Studies and Contracts

A2D2	Anti-Armor Defense Data	DUSA-OR
AFPDA, FY 93-99	Army Force Planning Data and Assumptions, FY 1993 - 1999	DCSOPS
ALBF-DA	AirLand Battle Future - Deployment Analysis	TRAC-FLVN
ALENO	Alternate Enlistment Options	DCSPER
ASM-EA	Armored Systems Modernization - Economic Analysis	DCSOPS
ASM-SUSOPS	Armored Systems Modernization - Multicorps Sustained Operations Analysis	DCSOPS
CASMO VER I	Combat Analysis Sustainability Model Verification I	CAA
CTLS AIR	CTLS Air Model	SIMTECH
CTLS-90	Concurrent Theater-Level Simulation, 1990	DUSA-OR
FOCUS 85-94	Force Comparison US vs Soviet 1985-1994	DCSOPS
FORCE 90/97	Force Evaluation, FY 90/97	DCSOPS
FORCEM/SUN	Interactive FORCEM on SUN	DUSA-OR
FUTEUR	Future Army, Europe	DCSOPS
GABY	Generic Application Blackboard Yoking	DUSA-OR
GDAS I	Global Deployment Analysis System, Phase I	CAA
GDAS IV&V	Global Deployment Analysis System, Phase I IV&V	CAA
GOLAN	Wargame Golan Heights '73	CAA
HOKKAIDO 90	Wargame Hokkaido FY 90	USARJ
JMNA-AMR 90	Joint Military Net Assessment - Army Mobility Requirement Study, FY 90	DCSOPS
MOBCEM-FD	Mobilization Capabilities Evaluation Model - Functional Description	DCSOPS
NATO 2000	NATO 2000	DCSOPS
NoREDs	Nonreduction Measures	DCSOPS
NTWRE-91	Near-Term Wartime Requirements, Europe, FY 91	DCSOPS
OMNIBUS-91E*	US Army Operational Readiness Analysis Study - FY 91 Europe	DCSOPS
OMNIBUS-91K*	US Army Operational Readiness Analysis Study - FY 91 (NEA)	DCSOPS
OMNIBUS-91M*	US Army Operational Readiness Analysis Study - FY 91 (SWA)	DCSOPS
OMNICHEM	US Army Operational Readiness Chemical Analysis	DCSOPS
P2RAM	Peer Review Process & Accreditation of Models	DUSA-OR
PFCA	Program Force Capability Assessment	DCSOPS
POMCANAL	POMCUS Analysis	PAE
PREFOR	Preprocessor FORCEM	MISMA
PT89	Persian Tiger-89	TUSA
ROA	Rates of Advance in Historical Land Combat Operations	Sec Army
SOFRS-89	Special Operations Forces Requirements Study	DCSOPS
SWA-I	Wargame Southwest Asia I	TRADOC
TACNUC	Theater Nuclear	CAA
TW-90	Time Warp Operating System	DUSA-OR
WGASST	Wargaming and Political/Military Game Assistance	DCSOPS

## - FY 90 Quick Reaction Analyses

ALTFORS-MA	Alternate Forces - Mobility Analysis	DCSOPS
ASWAP	Analysis of Southwest Asia Ports	DCSLOG
CMEDREQ	CFE Medical Requirements	CSA
CONCOR-3	Contingency Corps - 3	DCSOPS
CONCOR-SWA	Contingency Corps - Southwest Asia	DCSOPS
CONFOR	Contingency Force Planning Issues	DCSLOG
CONSTANT-TGSM	Conventional Stability Assessment - Effects of Terminally Guided Submunitions	DCSOPS
CONSTANT-WARN	Conventional Stability Assessment - Warning Time	DCSOPS
COSWA	Contingency Operations - Southwest Asia	DCSOPS
COSWA-ALFOR	COSWA - Alternative Force	DCSOPS
COSWA-ALT	COSWA - Alternative Contingencies	DCSOPS
COSWA-BEEFS	COSWA - British, Egyptian, French, and Syrian	DCSOPS
COSWA-CAS	COSWA - Casualties	DCSOPS
COSWA-FASTALS	Contingency Operations SWA - FASTALS	DCSOPS
COSWA-REQ	Contingency Operations, Southwest Asia - Requirements	DCSOPS
DESCASS	Desert Shield Casualty Stratification	TAPC-MOP
DESCASS(R-1)	Desert Shield Casualty Stratification (Rev 1)	TAPC-MOP
DSAW-BLUE	Desert Shield Air Warfare Study	DCSOPS
DSAW-RED	Desert Shield Air Warfare Study	DCSOPS
ECBAS	Engineer Studies Center Bomber Assessment Study	ESC
ENACC	Enlisted Accessions Alternatives	DCSPER
EUFORSTAL	European Forward Stationed Alternatives	DCSOPS
FORANT	Future Force Alternative	DCSOPS
FUPAC	Future Army Forces Pacific	DCSOPS
HAWG	Hokkaido Air War Game	USARJ
I2A2	Improving Investigative and Audit Analysis	DAS
MEDSWA	Medical Southwest Asia	OTSG
MILRISK	Military Risk Assessment	DCSOPS
MINI-TAA	Mini-Total Army Analysis	DCSOPS
MSAM	Medium Surface-to-air Missile Study	DCSOPS
NUCRED/I	Army Tactical Nuclear Weapons in a Reduced Force Environment, Phase I	DCSOPS
PLANNER-R&D	LOG PLANNER Extension to Include the Long-range Research, Development, and Acquisition Plan	DCSLOG
POMCANAL	POMCUS Analysis QRA	PAE
POMOP	Program Objective Memorandum Options	DCSOPS
PSS-EX	Personnel Service Support - Excursion	DCSOPS
PTADS	Persian Tiger Air Defense Study	DCSOPS
Q-FOCUS	Quick - Force Comparison US vs Soviet	OCSA-CAIG
Q-FORCE-91	QUICKSILVER - Force Evaluation 91	DCSOPS
QUICK RATES	Southwest Asia Rates Update	DCSOPS
QUICKSILVER-1	QUICKSILVER - 1	DCSOPS
QUICKSILVER-2	QUICKSILVER - 2	DCSOPS
RCOSWA	Requirements, Contingency Operations, Southwest Asia	DCSOPS
RECONCORPS	Reconstitution of a Contingency Corps	DCSOPS

REDPATH	Reduction Dynamics Assessment	DCSOPS
RE-FOCUS/CFE	Remodel Force Comparison US vs Soviet - CFE	DCSOPS
RE-FOCUS PLUS	Remodel Force Comparison US vs Soviet CFE Plus	DCSOPS
S-PTADS	Son of Persian Tiger Air Defense Study	DCSOPS
STAMKRAM	STARDUST Mobility/Firepower Kill Replacement Analysis	DCSOPS
STARDUST	STARDUST QRA	DCSOPS
STARMAN	STARDUST Mobility Analysis	DCSOPS
STRATANAL	Casualty Stratification Model (CSM) Analysis	TAPC/MOP
STRATDEF	STRAT Defender Validation Study	JCS
SWADAN	Southwest Asia Deployment Analysis	DCSLOG
SWADAN-CONOP	Southwest Asia Deployment Analysis, 1st Update	DCSLOG
SWADAN-FORMODE	Southwest Asia Deployment Analysis - 2d Update	DCSLOG
TAFES	Total Army Force Evolution Study	DCSOPS
TANK FLEET	Tank Fleet Analysis	DCSOPS
TANKRISK	Tank Fleet Risk Analysis	DCSOPS
TFRO	Total Force Roundout	DCSOPS
TIGER CLAW 90	TIGER CLAW 90 Wargame	DCSOPS
TIGER CLAW AD	TIGER CLAW 90 Air Defense Study	DCSOPS
TSADS	TIGER SWORD Air Defense Study	DCSOPS
TS 90	Wargame Tiger Sword '90	DCSOPS
TS-90 VARIANTS	Tiger Sword 90 Variants	DCSOPS
UCP	Unified Command Plan	DCSOPS
VER-STRAT	Verification of the Casualty Stratification Process	TAPC/MOP

#### - FY 89 Studies

ABAKUS	Analysis of Barrier System Alternatives - Korea	ESC-CE
ALB-F	AirLand Battle (Heavy) - Future	TRADOC
ALOGFACTS	Analysis of Logistics Factors Study	DCSLOG
AMARQ	Alternative Methods of Ammunition Requirements Computations	DCSOPS
BREAKPOINT	Forced Changes of Combat Postures	HQDA
CASMARG-ASA	Close Air Support Mission Area Review Group Army Study Assessment	DCSOPS
CASMO II	Combat Analysis Sustainability Model Development Program, Ph II	OTEA
CHEMSCAN	Chemical Support Combat Analysis NATO	DCSOPS
CISE	Combat Identification Systems COMO Integrated Air Defense Model Evaluation Study	CAA
CONSTANT	Conventional Stability Assessment	DCSOPS
DAMANS	CAA Data Management System	CAA
DFD	Design for Discard Study	AMC
EDCA	European Division Combat Analysis FY 91-96	DCSOPS
FIRE	Fire Fighting Task Force	CAA
FOMOA	Force Modernization Analyzer User Manual	DCSOPS
FORCE 88/89	Force Evaluation, 1988/1989	DCSOPS
FTF	FORCEM Task Force	AMIP
HAMMER 88	COMO HAMMER 88 Validation Study	CAA
HOKKAIDO II	Wargame HOKKAIDO II	USARJ
IADA	Integrated Air Defense Assessment Study	32AADCOM

IFCS	Improved Force Closure Study	DCSOPS
JAPORS	JSCP CS/CSS Apportionment Study	DCSOPS
JMNA 88/89	Joint Military Net Assessment, Army Mobility Analysis, 88-89	DCSLOG
LATAM I	Wargame Latin America Theater I	TRAC-FLVN
LITL DECK	Limited Input Theater-level Deck	CAA
LOG PLANNER	Logistics Force Planner Assistant Study	DCSLOG
MICAF-PROCIP	Measuring Improved Capabilities of Army Forces-Process Improvement	CAA
NG LOG	National Guard Logistics Study	NGB
NUX-97/II	Analysis of Nuclear Expenditures for FY 97/Phase II	DCSOPS
OMNI-89E FORCEM	Operational Readiness Study FY 89 Europe FORCEM	CAA
OMNIBUS-91DA	Operational Readiness Study-91 Deployment Analysis	DCSOPS
PFCA-DA	Program Force Capability Analysis - Deployment Analysis	DCSOPS
POL FACTS	Petroleum, Oils, and Lubricants Factors Analysis	DCSLOG
RETRO II	Retrograde Transportation Study II	DCSLOG
SAC II	Sensitivity Analysis COSAGE II	CAA
SATA	Small Arms Threat to Aircraft Study	DCSOPS
SCAN	Support-Combat Analysis NATO	DCSOPS
SCAN DA	Support-Combat Analysis NATO - Deployment Analysis	DCSOPS
SRA-96	Support Force Requirements Analysis, FY 92-96	DCSOPS
TAME	Target Acquisition Methodology Enhancement	CAA
TRIPM	Transportation Improvement Program - Models	DCSLOG
TRIPP	Transportation Improvement Program - Planning	DCSLOG
TROMSO II	Wargame TROMSO II	DCSOPS
TWELVE	Tactical Wheeled Vehicle Modernization Planning Study	DCSOPS
VICIMP	Vector-In-Commander (VIC) Implementation Study	CAA

#### - FY 89 Quick Reaction Analyses

ALTFORS/MRFS	Alternative Force 1	DCSOPS
AMSAA QRA	Chemical Defense Equipment Consumption Rates	AMSAA
AVECAS	Identify Average Division Casualty Rates	PERSCOM
BDECAS	Information for Developing Brigade Casualties	7th Army
CHEMQRA	Special Chemical Analysis for BG Eggleston	DCSOPS
CML SCH QRA	Chemical School QRA	USACMLS
CONCOR-I	Contingency Corps - Contingency Corps Active Force Capability	DCSOPS
CONCOR II	Contingency Corps II - Contingency Corps Active Force Capability	DCSOPS
CONSTANT DEMO	Exercise CONSTANT DEMO Support	USAF
CONSTANT-M+10	Constrained Deployment Assessment	DCSOPS
CONSTANT-EUR	Assessment of USAREUR-defined Conventional Force Reduction	USAREUR
CONSTANT-UK	US Proposal Assessment	DCSOPS
CONSTANT-UNI	Soviet Unilateral Reduction Assessment	DCSOPS
CR/CZ CAS	Corps Rear & COMMZ Casualty Rates Study	DCSLOG
CSM-II SPT	Casualty Stratification Model II Support Project	TRADOC

E-TBMD SUP	European - Tactical Ballistic Missile Defense Study Supplement	DUSA-OR
EPW-EX	Enemy Prisoner of War - Excursion	CAA
FRIQM	Force Reduction Impact on Quartermaster Units	DCSOPS
IFCS	Improved Force Closure Study	DCSOPS
Longbow	Longbow QRA	DCSOPS
MAC	Manprint Advanced Concept Book	DCSPER
MORIMOC II	Chair Symposium on Modeling Humans in Combat	DUSA-OR
NOCS	NATO ORSA Cell Support	
OSD(P&L) Paper	Review of OSD Paper on "The Consideration of Logistics Factors in Munitions Requirement Determination"	OSD
PRESBUD	President's Budget - Force Structure Alternative	DCSOPS
QRACC	QRA Contingency Corps	DCSOPS
QRARED	QRA - NATO Reductions	DCSOPS
RAND QRA	QRA for RAND Corporation	DCSOPS
ROAR	Reporting of Aviation Readiness	DCSOPS

#### - FY 88 Studies

4M	Mix of Major Materiel and Munitions	SARDA
AAMTOR	Army Aviation Modernization Tradeoff Requirements	DCSOPS
AFPSA 89-98	Army Force Planning Data and Assumptions 89-98	DCSOPS
AMARQ	Alternative Methods for Ammunition Requirements Computations	DCSOPS
ARAMSS	Army Aeroscout Mix Sustainability Study	OTEA
BENCHMARKS	Historical Characteristics of Combat for Wargames	CAA
CAC	Conventional Arms Control Study	DCSOPS
CALAPER	System to Calculate Ammunition, Petroleum, and Equipment Rates	CAA
CAMP	Computer Assisted Match Program	CAA
CASMO I	Combat Analysis Sustainability Model Study - Phase I - Model Functional Design	OTEA/CAA
CATSUP	Coop Analysis of the Simulated Process	CAA
CCCA-DEPLOYMENT	Close Combat Capability Analysis - Deployment Analysis Results	CACDA
CCCA-NUCLEAR	Close Combat Capability Analysis - Nuclear	CACDA
CHEMSTAA	Chemical Stockpile Assessment in AFCENT Study	DCSOPS
COMO HAMMER	COMO HAMMER Validation Study	CAA
COMPMIM	COMP Model Implementation	DCSOPS
CSRS	Combat Support Ratio Study	DCSOPS
DOMINO	Political/Military Game Domino	DCSOPS
EDWAR	Electronic Documentation of Wargame Results	CAA
E-TBMD	European - Tactical Ballistic Missile Defense Study	DCSOPS
ERCRULES	Equipment Readiness Code Rule System	DCSOPS
FASTALS	FASTALS Model Upgrade	CAA
FDM-AMPLE	Force Design Model Enhancements - AMPL	CAA
FDM-COSTING	Force Design Model Enhancements - Costing	CAA
FDM-GT	Force Design Model Enhancements - Game Theory	CAA
JAPAN-88	Japan Political-Military Wargame - 88	USARJ

JPAM-MA	Joint Program Assessment Memorandum Mobility Analysis	DCSLOG
MERCAD-EAD	Measuring Relative Capabilities of Army Forces - Echelon Above Division	DCSLOG*
MICAF-87	Measuring Improved Capabilities of Army Forces 87	DCSOPS
MICRO-PFM	Microcomputer Patient Flow Model	TSG
MME-CDE	Modeling and Measuring Effects of Conventional Defense Enhancements	DCSOPS
MRFS-87	Mid-Range Force Study 1987	DCSOPS
MVC	MICAF Vector Comparison	CAA
NUX 97/1	Tactical Nuclear Weapons Requirements in 1997	DCSOPS
OMNI-89DA	OMNIBUS-89 Deployment Analysis	DCSOPS
OMNI-89FRCM	OMNIBUS-89 FORCEM	DCSOPS
P93E	Wartime Requirements Programing FY 93 Europe	DCSOPS
P93E-ADMR	Wartime Requirements Programing FY 93, Europe - Air Defense Munitions Requirements	DCSOPS
PERU	Prepositioned Equipment Rotational Units	DCSOPS
RETRO I	Wartime Retrograde of Damaged Materiel from a Theater	DCSLOG
SAC	Sensitivity Analysis of COSAGE	CAA
STARS	Strategic Transportation Analytical Requirements	DCSLOG
TARGEN	Target Generation: E5/E6 Enlisted Promotions	DCSPER
TMORR	Theater Model Requirements Review	CAA
TOP GUN	Wargame Top Gun	DCSOPS
TROMSO	Wargame TROMSO	DCSOPS
V-22 SAS	V-22 Self-deployment and Sustainment Alternative	TRADOC
VICFAM	VIC Familiarization Study	CAA
WARMAPS-90/94	Wartime Manpower Planning System, FY 90 & FY 94	DCSPER
WESTWIND	Wargame WESTWIND	WESTCOM
WESTWIND P/M	WESTWIND Political/Military Game	WESTCOM

#### - FY 88 Quick Reaction Analyses

10-IN-10	10-IN-10	DCSOPS
FURNVAL	Furniture Model Validation	VCSA
RCDCS	Reserve Component Deployment Capability Study	DCSOPS
RCFTM	Reserve Component Force Tank Modernization	DCSOPS

#### - FY 87 Studies

ADEO	Air Defense Enlistment Options	32AADCOM
AFPSA 88-97	Army Force Planning Data and Assumptions, FY 88-97	DCSOPS
AHART	An Analysis of Historical Artillery Expenditures - CY 87	CAA
AFP/AMORE	Analysis of Force Potential/Analysis of Military Organizational Effectiveness	CAA
BFVCA-II	Bradley Fighting Vehicle Capability Analysis-2	DCSOPS
CASMO	Concepts Analysis Agency Sustainability Model	CAA



CHASE	Combat History Analysis Study Effort	CAA
CHEMWINS	Chemical Warfare in NATO	DCSOPS
CMES	COMO IAD Model Evaluation Study	CAA
COPRS	COHORT Package Replacement System Analysis for Infantry/Field Artillery/Armor	DCSPER
COMPMEX	Constrained Munitions Procurement Model Extension	CAA
CTF	Combat Sample Generator Model Task Force	CAA
EPM	E5/E6 Promotion Model	DCSPER
ESTIMATE-86	Estimation of FY 86 Workloads for Continental United States Wholesale Logistics Base	DCSLOG
EXSYN	Expert System Initiative in Logistics Readiness	DCSOPS
FAME	Match Process for Support Force Requirements Analysis	CAA
F-CAP	Force Closure Analysis Program	XVIIIABN
FALL BALL	FALL BALL Excursion	DCSOPS
HOKKAIDO P/M	Wargame Hokkaido - Political/Military Game	DCSOPS
INDUS RIVER	Wargame INDUS RIVER	DCSOPS
IR/RAD	Independent Review/Reassessment of Anomalous Data (contract effort)	CAA
LHF	Light Helicopter Fleet Study	DCSOPS
LHX-P	The LHX Parametric Performance and Cost Analysis	DUSA(OR)
LOWROAD	Wargame LOWROAD	DCSOPS
MICAF-86	Measuring Improved Capabilities of Army Forces, FY 86	DCSOPS
MICRO-FAS	Micro-FASTALS, A Contingency Force Development Model	DCSOPS
MINUTE WAR	The Minute War	DCSOPS
MOBDABS	Mobilization Data Base Management Study	CAA
MOBPES	Mobilization Policy Evaluation Study: Model Sensitivity Analysis	DCSPER
MOBPLAN	Mobilization Planning System Analysis	CAA
MRFS-86	Mid-Range Force Study - 1986	DCSOPS
MRFS-MI	Mid-Range Force Study - Model Improvements	DCSOPS
NTCPE	National Training Center Prepositioned Equipment	DCSOPS
NEACA	Northeast Asia Campaign Analysis	DIA
NUFAM III	Nuclear Fire Planning and Assessment Model III	CAA
NUREQ-92	Theater Tactical Nuclear Requirements - 1992	DCSOPS
OMNIBUS-86	OMNIBUS Capability Study - FY 86	DCSOPS
P2FA	Prisoner Population Flow Analysis	DCSPER
P90K-105EX	Indirect Fire Excursion to P90K	DCSOPS
PERSIAN TIGER	Wargame PERSIAN TIGER	USARCENT
RENBO	Evaluation of the ARMYEQDP Retention Model	DCSPER
RFS	Representative Force Study	DCSOPS
RPV	Remotely Piloted Vehicles	DCSOPS
RSI	Rationalization, Standardization, Interoperability	DCSOPS
S3LPF-II	Support Force Structure Sensitivity to Logistics Planning Factors	DCSLOG
SFRS-86	Special Forces Requirements Study II	DCSOPS
SPRINT	Symbolic Processing in Transportation Force Analysis	CAA

SRA-93	Support Force Requirements Analysis, FY 89-93	DCSOPS
SSPK	Single Probability of Kill (contract effort)	CAA
TAS III/2	Target Acquisition Study III, Phase 2	DCSOPS
TERP	Transportation Evaluation Research Project	CAA
TRIP-R	Transportation Improvement Program Requirements: Functional Description of the Strategic Mobility Module	DCSLOG
UFSS	Ultra-Fast Sealift Study	DCSOPS
VIC	Vector In Commander	CAA
WARMAPS 89/93	Wartime Manpower Planning System, FY 89 & FY 93	DCSPER
WAROST	Wartime Order Ship Time	DCSLOG
WRBS	War Reserve Balance Study	DCSLOG

**- FY 86 Studies**

4CEM2	Documentation of the CEM Inputs for the CEM/FORCEM FY 85 Comparison	CAA
ABCDE/S	AirLand Battle Conventional Defense Enhancement/Synergy	DCSOPS
ADM2	Air Defense Model Modification	CAA
AIMS	Army Item Management Study	DCSRDA
AIS	Artificial Intelligence Study	CAA
AFPDA 86-95	Army Force Planning Data and Assumptions, FY 86-95	DCSOPS
ASMSA I	Army Strategic Mobility System Assessment I	DCSLOG
ASPP	The Army in the Strategic Planning Process	CAA
ATACMS	Estimation of Army Tactical Missile System Expenditures - 1990	DCSOPS
BFVCA	Bradley Fighting Vehicle Capability Analysis	DCSOPS
CAMAD	Chemical Assessment Methodology and Data	CAA
CENFOR	Command and Control (C2) Enhancement for FORCEM	CAA
CFAS	Contingency Force Analysis Study	CAA
CFSDT	Centrally Funded Second Destination Transportation Cost	DCSLOG
COMARS	CONUS Base Manpower Requirements Equation Improvement Study	CAA
COSIP	COSAGE Improvement Program	CAA
ESTIMATE	Estimate of Workloads - CONUS Wholesale Logistics Base	DCSLOG
FALKLANDS	Falklands Wargame	CAA
FORGE	FORCEM Gaming Evaluation	CAA
HOKKAIDO	Wargame Hokkaido	DCSOPS
ILA	Intertheater Lift Assessment	DCSOPS
JPAM	Joint Program Assessment Memorandum	DCSLOG
LCAAA	Lift Capability of Army Aviation Assets	CAA
MAXFLY-PS II	MAXFLY Planned Storage of Aircraft II	DCSLOG
MC2	MICAF-CEM Comparison	CAA
MCXFAC	Military compensation X Factors	DCSPER
MEPER	Model Effectiveness - Personnel (Fellowship)	CAA
MERCAF-EUR	Measuring Improved Capabilities of Army Forces - Europe	DCSOPS

MICAF-85	Measuring Improved Capability of Army Forces, FY 85	DCSOPS
MED-RIM	Wargame Mediterranean Rim	DCSOPS
MOBREPS	Mobilization Base Resource Planning System	CAA
MRFS-85	Mid-Range Force Study - CY 85	DCSOPS
NLGP	Nonlinear Goal Programing Study (Fellowship)	CAA
OCE	Operational Casualty Estimation	DCSPER
OMNIBUS-85	OMNIBUS Capability Study - FY 85	DCSOPS
P91M	Wartime Requirements Programing FY 91, Southwest Asia	DCSOPS
P91MAE	Wartime Requirements Programing FY 91, Southwest Asia Air Excursion	DCSOPS
POSTFOR	Postprocessor for FORCEM	DA-AMIP
RECPOM-85	Resource Constrained Procurement Model - FY 85	DCSOPS
RSPM	Retail Supply Performance Measures	DCSLOG
S3LPF	Support Force Structure Sensivity to Logistics Planning Factors	DCSLOG
SMF	Substitute Munition Factors	DCSOPS
SRA-92	Support Force Requirements Analysis, FY 92	DCSOPS
T2S	TRADOC Theater Scenario	TRADOC
TAS III	Target Acquisition Study III	CAA
TDAA	Tank Distribution Analysis - Addendum	DCSOPS
THRACE	Wargame Thrace	DCSOPS
TSOSS	Theater Strategic Objectives Sensivity Study	DCSOPS
UCS3	USAREUR CSS Study	CSA
USURS	USAREUR Support Unit Replacement Study	DCSLOG
URSA-IN/FA/AR	Unit Replacement System Analysis Infantry/Field Artillery/Armor	DCSPER
WARMAPS 88/92	Wartime Manpower Planning System, FY 88 and FY 92	DCSPER
WARPASS	Wargame Mountain Pass	DCSOPS
WARPASS P/M	Wargame Mountain Pass - Political/Military Game	DCSOPS

- FY 85 Studies

A3RC	Army Awards Analysis Study - Reserve Components	DCSPER
AH-64 AO/AI	AH-64 Availability, Operational and Availability, Inherent Relationship Study	DCSLOG
AFPDA 85-94	Army Force Planning Data and Assumptions, FY 85-94	DCSOPS
AFPDA 86-95	Army Force Planning Data and Assumptions, FY 86-95	DCSOPS
APICP	Army Physical Inventory Control Procedures	DCSOPS
ARTS	Armor Resources for Training Study	DCSOPS
ASPM-1	Army Strategic Planning Model - Test 1	DCSOPS
ATALO	Analytic Assistance to the Tank Automotive Office	DCSLOG
CH-47 MAX FLY	Maximizing CH-47C/D Daily Flying Hours Study	DCSLOG
CEC	Casualty Estimation for Contingencies	DCSPER
CRR	Casualty Replacement Rates	CAA
DARQ	Development of the Analytic Requirements Model	DCSOPS
DIVAD	Division Air Defense Gun	TRADOC
DCSL	Division Combat Sample Library	DCSOPS

DPQ-AMA, FY 86	Defense Planning Questionnaire, Army Mobility Analysis, FY 86	DCSOPS
E-MEPSCAT	Evaluation of the Military Entrance Physical Strength Capacity Test	DCSPER
FLAME	Force Level Analog Modeling Evaluator	CAA
IMALOG	Improved Methods of Automated Logistics System Development	DCSLOG
IWSS	Integrated Warfare Scenario Study	CAA
JPAM-AMA 87-94	Joint Programing Assessment Memorandum, Army Mobility Analysis, FY 87-94	DCSOPS
LCCA-CA	Light Corps Capability Analysis - Campaign Analysis	DCSOPS
LCCCA-ACOFPA	Light Corps Capability Analysis - Airborne Corps Firepower Potential Assessment	DCSOPS
LIDCA-FPSA	Light Infantry Division Capability Analysis - Firepower and Survivability Potential	DCSOPS CAA
NAPM	Network Analysis Planning Model	DCSOPS
NAPM-JAG	Network Analysis Planning Model for The Judge Advocate General	DCSOPS
NUCAD	Nuclear and Chemical Assessment Data	DCSOPS
MAXFLY-PS2	Maximizing Daily Helicopter Flying Hours - Planned Storage of Aircraft	DCSLOG
MICAF	Measuring Improved Capabilities of Army Forces	DCSOPS
MICAF-IMPAACT	Measuring Improved Capabilities of Army Forces Improved Allocation to Achieve a Capability Target	DCSOPS
MICAF-POMCUS/ PURE	Measuring Improved Capabilities of Army Forces POMCUS/PURE Excursion	DCSOPS
MIFO	MICOM Industrial Fund Operations	DCSLOG
MIRA	Management Information Resource Analysis	CAA
MRFS-84	Mid-Range Force Study, CY 84	DCSOPS
OPTP	Overview/PARCOM Turnkey Project	DCSLOG
P90K	Wartime Requirements for Ammunitions and Materiel, Korea FY 90	DCSOPS
PFCA-90	Program Force Capability Analysis - FY 90	DCSOPS
PFCA-90EX	Program Force Capability Analysis - FY 90 Extended	DCSOPS
OMNIBUS-84	OMNIBUS Capability Study - FY 84	DCSOPS
SFRNEA	Support Force Requirements for Northeast Asia	USARJ
SFRS	Special Forces Requirements Study - Problem and Method Development	DCSOPS
SWALE-91	Southwest Asia Logistics Civil Augmentation Program Estimate	DCSOPS
TARMS II	TRASANA Aircraft Reliability and Maintainability Simulation Upgrade	CAA
TDA	Tank Distribution Analysis	DCSOPS
TFCA-AMR	Total Force Capability Assessment, Army Movement Requirements	DCSOPS
TRAC	Transportation Model Comparison	DCSOPS
TWFS-I	Transportation Workload Forecasting Study - Implementation	MTMC
URSA IV	Unit Replacement System Analysis IV	DCSPER
WARMAPS 87-91	Wartime Manpower Planning System - FY 87-91	DCSPER

WCE	Wartime Manpower Planning System Casualty Estimation	DCSPER
- FY 84 Studies		
10K DIV ANAL	10K Division Analysis	VCSA
A3	Army Awards Analysis	DCSPER
AFP	Analysis of Force Potential	CAA
AIFAS	Army Industrial Fund Analytical Study	DCSLOG
AIRCRAFT SPARES	Aircraft Spare Stockage Methodology Study	DCSLOG
ALRA-TA	Army Long-range Appraisal - Trend Analysis	DCSOPS
ASTOE	Analytical Support to Europe Study	USAREUR
ATPAS	Army Tank Program Analysis Support	TRADOC
CFA DEMO 1004	Contingency Force Analysis Demonstration - OPLAN 1004	DCSOPS
CMG	Combat Sample Generator (COSAGE) Maturity Group	CAA
COCADO SWA-88	Containerized Cargo Distribution Analysis, Southwest Asia - 88	DCSLOG
CORF	Combat Operational Readiness Float Factors	DCSLOG
COSAGE-FORCE	COSAGE-Force Model Comparison	CAA
DOSS	Days of Sustainability Study	DCSLOG
EME	Effective Date Model Enhancement	DCSLOG
EWL	Estimation of Workload for Logistics Civilian Augmentation Program	DCSLOG
FITREQUEST	First-Term Reenlistment Quality Study	DCSPER
HERO	Analysis of Factors that have Influenced Outcomes of Battles and Wars: A Data Base of Engagements and Battles	CAA
HIPS	Howitzer Improvement Program Support	TRADOC
ICEES	Improved Casualty Estimation and Evacuation System	TSG
INTCEM	Interruptible Concepts Evaluation Model	CAA
JPAM	Joint Programing Assessment Memorandum, Army Mobility Analysis	DCSOPS
MASS	Methodology for Alternative Support Structures	CAA
MESA	Multi-Echelon Stockage Analysis	DCSLOG
MICAF-I	Measuring Improved Capabilities of Army Forces	DCSOPS
MOBREM V	Mobilization Base Requirements Model	DCSOPS
MRFS-83	Mid-Range Force Study, CY 83	DCSOPS
OASYS	Officer Assignment System Study	DCSPER
OMNIBUS-83	OMNIBUS Capability Study - FY 83	DCSOPS
P90E	Wartime Requirements, Programing - FY 90 Europe	DCSOPS
PRIM	Personnel Readiness Indicator Model	DCSPER
PROJECT 45	Project 45	CAA
R85E	War Reserve Requirements, Europe, FY 85	DCSOPS
RECPOM	Resource Constrained Procurement Objectives for Munitions	DCSOPS
REPAST	Regimental Personnel Allocation Study	DCSOPS
SAM	Supply Apportionment Methodology	DCSLOG
SWAPS	Southwest Asia Pipeline Study	DCSLOG
TAA-90	Total Army Analysis, FY 86-90	DCSOPS
TPM	Threat Planning Model	ACSI
TUP	TRANSMO Update Program	CAA

TWFS	Transportation Workload Forecasting Study	DCSLOG
UIAC	Utilization of Increased Aircraft Capability	DCSLOG
WAFF II	Wartime Fuel Factors Model II	DCSOPS
WARMAPS 86-90	Wartime Manpower Planning System - FY 86-90	DCSPER

- FY 83 Studies

ABCA QWG/CD	American, British, Canadian, Australian Quadripartite Working Group on Combat Developments	MACOM
ABCD	Apache, Black Hawk, and Chinook Helicopter Self-deployment Cost and Benefit Study	DCSOPS
ADDS	Analysis to Determine Distribution of Systems	DCSOPS
AFPSA 84-93	Army Force Planning Data and Assumptions FY 84-93	DCSOPS
AMMEN	Econometric Model for Optimizing Troop Dining Facility Operations (The Army Master Menu Study)	DCSLOG
AP3	Army Prisoner Population Prediction Study	DCSPER
ARSTOCK I	Evaluation of Army Stockage Objectives Phase I	DCSLOG
ACE	Deterrence and Defense Concepts for Europe	CAA
ALRA I	Army Logn-Range Appraisal Phase I Study	DCSOPS
BOWS	Base Operations Workload Study	DCSLOG
CIEW	Communications/Intelligence/Electronic Warfare Methodology	CAA
COCADA	Containerized Cargo Distribution Analysis	DCSLOG
COPPERHEAD REQ	COPPERHEAD Requirement Evaluation	DCSOPS
DIA SPT	Defense Intelligence Agency Support Study	DIA
DIV LEVEL AMMO	Division Level Ammunition Consumption Estimates	DCSOPS
FALSTAF	Forward Area Laser Systems - Tactical & Fiscal	DCSRDA
IDOFOR III	Improving the Definition of the Army Objective Force	DCSOPS
JPAM	Joint Program Assessment Memorandum, FY 85-92 Army Mobility Analysis	DCSLOG
JSPDA-82	Joint Strategic Planning Document Analysis-1982	DCSOPS
LFSA	Logistics Force Structure Analysis	LOGCEN
MAX FLY	Maximizing Daily Helicopter Flying Hours Study	DCSLOG
MTO DATES	Management of MTOE Effective Dates Based on Equipment Availability Study	DCSLOG
NATO PANEL XI	NATO Panel XI - Tactical and Logistics Concepts	MACOM
OMNIBUS-92	OMNIBUS Capability Study - FY 82	DCSOPS
RIM-E	Readiness Indicator Model Evaluation at Logistics Evaluation Agency	DCSLOG
R87M	Wartime Requirements for Southwest Asia, FY 87	DCSOPS
SECNUM	Security of Nuclear Weapon Movements Study	DCSPER
SWASIA PREP	Southwest Asia Prepositioning	DCSLOG
TAA-88	Total Army Analysis FY 1984-1988	DCSOPS
TAA-88 AYA	Observations on Models Used in TAA-88	CAA
TFMS	Tank Fleet Modernization Strategy Study	DCSRDA
TRNG EFF	Training Effectiveness Study	DCSPER
URSA III	Unit Replacement System Analysis III	DCSPER
USAREUR PROD SUR	Support for Operational Analysis of Production Surge Planning	DCSOPS

WARMAPS 85-89	Wartime Manpower Planning Systems Analytical Support, FY 85-89	DCSPER
- FY 82 Studies		
AFPDA 83-92	Army Force Planning Data and Assumptions, FY 83-92	DCSOPS
CES	Casualty Estimation Study	DCSOPS
FEWTS-EX	Force Electronic Warfare/Tactical SIGINT - Expanded	TRADOC
FOFEBA	Forward of the FEBA Weapon System Cost and Benefit Study, Phases I and II	DCSOPS
FSRS	USAREUR OPLAN Force Structure Requirements Study	HQUSAREUR
IDOFOR II	Study for Improving the Definition of the Army Objective Force Methodology, Phase II	DCSOPS
JPAM	Joint Program Assessment Memorandum Mobility Analysis, FY 83-90	DCSLOG
JSPDA	Joint Strategic Planning Document Analysis, CY 1981	DCSOPS
N/A	Mobility Asset Distribution Guidance Study	DCSOPS
OMNIBUS-81	OMNIBUS Capability Study - FY 81	DCSOPS
RDJTF	Rapid Deployment Joint Task Force Air Defense Study, Phase II	DCSOPS/USAF
P88E	Wartime Requirements Program, FY 88 Europe	DCSOPS
PALRA	Prototype Army Long-Range Appraisal	DCSOPS
SRB	Selective Reenlistment Bonus	DCSPER
TAA-87	Total Army Analysis FY 1987	DCSOPS
TIWSS	Theater Integrated Warfare Scenario Study	DCSOPS
URSA I	Unit Replacement System Analysis I	DCSPER
URSA II Ex	Unit Replacement System Analysis - Extention	DCSPER
- FY 81 Studies		
AFPDA 81-90	Army Force Planning Data and Assumptions, FY 81-90	DCSOPS
ACMIP	Automated Force/Material Cost Methodology Improvement Project	CAA
ADPET	Automatic Data Processing Equipment Transition	CAA
AMMO P87/ WARF P-87	Korea Wartime Requirements for Ammunition and Material, FY 87 - Korea	DCSOPS

AMMO P86/ WARF P-86 ANACE-87	Korea Wartime Requirements for Ammunition and Material, FY 87 - Korea Army Net Assessment of US/NATO and Soviet/ Warsaw Pact Gound Combat Force in Central Europe	DCSOPS DCSOPS
AWADS DEWCOM T&E	Army Wartime Asset Distribution Guidance Study Division Electronic Warfare Combat Model Test and Evaluation	DCSOPS CAA
FEWTS GRREG IWRM JSPD MILES	Force Electronic Warfare/Tactical SIGINT Study Graves Registration Study Integrated Warfare Requirements Methodology Joint Strategic Plannaing Document Military Implication of Laser Employment by the Soviets	TRADOC DCSLOG CAA DCSOPS TRADOC
N/A MTM RETMOB ROJTF	Mobilization Manpower Policy Analysis Study Manpower Tradeoff Methodology Study Requirements for Total Mobilization Rapid Deployment Joint Task Force Air Defense Study, Phase I	DCSPER DCSPER DCSOPS DCSOPS/USAF
TARP-I TUCHA WARRAMP V	Total Army Requirements Program - Phase I Type Unit Characteriistics File Study Wartime Requirements for Ammunition, Material and Personnel, Phase V	DCSOPS DCSOPS CAA

#### - FY 80 Studies

ADPE AFPDA 80-89	Automatic Data Processing Equipment Replacement Army Force Planning Data and Assumptions FY 80-89	CAA DCSOPS
AMMO D-82	Nonnuclear Ammunition Combat Rates Distribution FY 82	DCSOPS
ANACE-86	Army Net Assessment of US/NATO and Soviet/ Warsaw Pact Gound Combat Force in Central Europe	DCSOPS
ARAP CEM-IMP CRP-87 CSBS N/A IC IDOFOR I	Alternative Resource Allocation Priorities CEM Improvements Chemical Research Project, 1983-87 Combat to Support Balance Study Combat Fuel Consumption Factors Implementation of Change Study Study for Improving the Definition of the Army Objective Force Methodology, Phase I	DCSOPS DCSOPS CAA CAA DCSOPS DCSOPS DCSOPS
NADDS-95 OMNIBUS-79 OMNIBUS-80 TAA-86 TRA-80 WEI/WUV	NATO Air Defense Deployment Study, 1981-1985 OMNIBUS Capability Study - FY 79 OMNIBUS Capability Study - FY 80 Total Army Analysis FY 1986 Thrace Requirements Analysis Weapons Effectiveness Endices/Weighted Unit Values	DCSOPS DCSOPS DCSOPS DCSOPS DCSOPS CAA
WARRAMP III/IV	WARRAMP Experimental Test and Production	CAA



### - FY 79 Studies

1-RMP	First Term Reenlistment Projection by Military Speciality	ASA(M&RA)
AFPDA 79-85	Army Force Planning Data and Assumptions FY 79-85	DCSOPS
AMMO P-85/ WARF-85	Wartime Requirements for Ammunition and Materiel, FY 81-85	DCSOPS
ANACE-84	Army Net Assessment of US/NATO and Soviet/ Warsaw Pact Gound Combat Force in Central Europe, 1978-1984	DCSOPS
ATHELO 1985	Attack Helicopter Organization 1985	DCSOPS
CEM-IMP	CEM Improvements	CAA
JADIS	Joint Air Defense Interoperability Study, FY 78 and 85	DCSOPS
N/A	JSPD Analysis - 1979	
MAKRO	Heavy/Light Forces Special Study	DCSOPS
NUREQ-84	Management Analysis of Key Resource Operations	DCSOPS/COA
POMOL	Theater Nuclear Force Requirements - 1984	DCSOPS
SSIPL	POMCUS Objective Levels	DCSOPS
	Methodology to Determine Support and Sustainability Implication of Increased POMCUS Levels	CAA
TAA-85	Total Army Analysis FY 1985	DCSOPS
TAS-II	Target Acquisition Study II	CAA
TFECS	Evaluation of the Theater Force Evaluation by Combat Simulation Methodology Development	CAA
TLS-86	Theater-level Scenario-86, Attack Helicopter Organization 1985	DCSOPS

### - FY 78 Studies

ACTAS	Army Consideration of Tactical Air Support	DCSOPS
ADRA II	Study of Effects of Alternate Allocation of Army Dollar Resources at Various Budget Funds - Phase II	CSA
AFPDA 78-84	Army Force Planning Data and Assumptions FY 78-84	DCSOPS
AMMO D-78	Nonnuclear Ammunition Combat Rates Distribution FY 78 - Korea	DCSOPS
AMMO P-84	Nonnuclear Ammunition Combat Rates Programing FY 84 - Korea	DCSOPS
AMMO P-80-84-E	Nonnuclear Ammunition Combat Rates Distribution FY 80-84	DCSOPS
AOCEUR	Alternative Operational Concepts in Europe	DCSOPS
N/A	CEM Research Project	DCSOPS
N/A	Comparative Analysis of Exercise Performance - Europe	DCSOPS
N/A	Follow-on NATO Standardization/Interoperability Analysis	DCSOPS
N/A	JSOP Analysis - 1977	DCSOPS
MBFR	Analysis of NATO Proposal in Mutual and Balanced Force Reductions Negotiations	DCSOPS

N/A	Net Assessment of NATO/Warsaw Pact Mobilization Potential, Phase I	DCSOPS
NUREM II	Nuclear Requirements Methodology II	DCSOPS
OMNIBUS-78	OMNIBUS Capability Study - FY 78	DCSOPS
PERCAP	Persian Gulf Requirements and Capabilities Analysis	DCSOPS
N/A	Defense of Alaska	DCSOPS
TAA-84	Total Army Analysis FY 1984	DCSOPS
WARRAMP II	Wartime Requirements for Ammunition, Materiel, Methodology Development	DCSOPS
XM-2 SPT	XM-2 Infantry Fighting Vehicle Simulation Support	DCSOPS

- FY 77 Studies

ADS-I	Air Defense Study I	DCSOPS
N/A	Analysis of NATO Standardization and Interoperability	DCSOPS
AMMO D-79	Nonnuclear Ammunition Combat Rates Distribution FY 78	DCSOPS
N/A	Ammunition Lift Analysis	DCSLOG
CEABREP	Cost Effectiveness Analysis of Bonuses and Reenlistment Policies	ASA(M&RA)
CONAF V	Conceptual Design for the Army in the Field	DCSOPS
INCA	Integrated Nuclear and Chemical Analysis	DCSOPS
INTACS II	Contribution of Integrated Tactical Communications System Alternatives to Division Combat-II	DCSOPS
N/A	JSOP Exercise - 1976	DCSOPS
MOC	Management of Change Study	DCSOPS
N/A	Movement Requirements, JSOP FY 79-85	DCSOPS
OMNIBUS-77	OMNIBUS Capability Study - FY 77	DCSOPS
RCAS	Army Requirements for Close Air Support	DCSOPS
TAA-83	Total Army Analysis FY 1983	DCSOPS
N/A	TRADOC Theater Level Scenario Support II	TRADOC
TRANSFORM	Tradeoff Analysis - Systems/Force Mix	DCSOPS
N/A	Wartime Replacement Factors, FY 78-82	DCSOPS
WARRAMP	Wartime Requirements for Ammunition, Materiel	DCSOPS
WARRAMP I	Wartime Requirements for Ammunition, Materiel, Methodology Definition	DCSOPS

- FY 76 Studies

AAH COEA	Advanced Attack Helicopter Cost and Operational Effectiveness Analysis	TRADOC
AMMO P78-82	Nonnuclear Ammunition Combat Rates Distribution, FY 78-82	DCSOPS
ARENUM	Analysis, Refinement, and Extension of Nuclear Methodology	CAA

ADRA I	Study of Effects of Alternate Allocation of Army Dollar Resources at Various Budget Levels	USA
N/A	Army Total Force Study - 1974	DCSOPS
CONAF IV	Conceptual Design for the Army in the Field	DCSOPS
EPOA	Exercise Plan of Analysis	DCSOPS
INTACS	Contribution of Integrated Tactical Communications System Alternatives to Division Combat	DCSOPS
JAGS	Joint Army/Air Force Air-Ground Study	DUSA(OR)
N/A	JSOP Exercise - 1975	DCSOPS
M60A3 FCI COEA	M60A3 Fire Control Instrumentation Cost and Operational Effectiveness Analysis	TRADOC
ODSAS	Officer Dual Speciality Allocation System	DCSPER
N/A	Operational Effectiveness of Communications	DCSOPS
N/A	POMCUS Objective Levels for Europe	DCSOPS
N/A	Procurement Study	DCSOPS
N/A	Readiness System Study, Phases I & II	DCSOPS
N/A	SAM-D COEA Red Team Support	DCSRDA
TAS	Target Acquisition Study	CAA
N/A	Theater Nuclear Force Support Study	DCSOPS
TILT ROTOR COEA	Tilt Rotor Aircraft System Cost and Operational Effective Analysis	DCSOPS
N/A	Total Force Analysis - 81	DCSOPS
WARF 80	Wartime Replacement Factors - FY 80	DCSRDA
WARSCAP	USAREUR Wartime Support Capability	USAREUR
WEI/WUV II	Weapons Effectiveness Indices/Weighted Unit Values II	DCSOPS/CAA
XM-1 SYS MIX	XM-1 System/Force Mix Cost and Operational Operational Effectiveness Analysis	TRADOC

#### - FY 75 Studies

N/A	AMMO P76-80 Rerun with the M139 (PI)	DCSOPS
N/A	CARMONETTE Model Validation of TETAM Results	CACDA
N/A	Catalog of Potential Conflicts	CAA
N/A	Combat Vehicle Swim Criteria	DCSOPS
N/A	Cost Effectiveness Analysis of Enlisted and Reenlistment Bonuses	ASA(M&RA)
N/A	Derivation of Military Force Structure	CAA
N/A	Division Force Equivalent Study	DCSOPS
N/A	Exercise Plan of Analysis, FY 77-84	DCSOPS
N/A	Force Planning Guides	DCSOPS
N/A	FOREWON JSOP Exercise - 1974	DCSOPS
N/A	FPP Methodology Review, FY 74	CAA
N/A	Greater Distinction Between Combat Modules in War Games	CAA
N/A	Heavy Lift Helicopter COEA	DARCOM
N/A	JSOP 77/74 Movement Requirements	DCSLOG
N/A	Land Force Requirements, Total Force Study	DCSOPS
N/A	Logistics Support Baseline Force Structure	DCSLOG
N/A	Management of Enlisted Bonus Recipients	ASA(M&RA)
N/A	Middle East War Game	CAA

N/A	Application of the 1973 Middle East War to CAA War Games, Models, and Simulations	CAA
N/A	Medical Mobilization Requirements	DCSOPS
N/A	Missile and Ammunition System Study	DCSOPS
N/A	NIKE HERCULES Effectiveness Study (1976-1980)	DCSOPS
N/A	Nonnuclear Ammunition combat Rates Methodology	DCSOPS
N/A	Nuclear Requirements Determination #1	DCSOPS
N/A	POM Deployment Requirements	DCSOPS
N/A	Preference Ordering of Programs in the Technology Base	DCSOPS
N/A	Programed Force Deployment Requirements	DCSOPS
N/A	Strategic Mobility Analysis of the Modified Corps in the Middle East	DCSLOG
N/A	Support for the Transfer of METOFOR II to CAA	DCSOPS
TANREM II	TANREM II	DCSOPS
N/A	Total Army Relationships	CAA
N/A	War Reserves Study	DCSOPS

- FY 74 Studies

N/A	AFFORD JSOP Exercise - 1973	DCSOPS
AFFORD	Analysis for General Purpose Force Objectives and Resource Determination Users Test	DCSOPS
N/A	Concepts Evaluation Model Conversion	CAA
AMMO P75-79	Nonnuclear Ammunition Combat Rates Programing FY 75-79	ACSFOR
AMMO P76-80	Nonnuclear Ammunition Combat Rates Programing FY 76-80	ACSFOR
N/A	ATLAS Model Modification	DUSA(OR)
N/A	AWACS/SAM-D Interoperability Study	ACSFOR
N/A	CEM/ATLAS Comparison	DUSA(OR)
CONAF III	Conceptual Design for the Army in the Field III	ACSFOR
N/A	Evaluation of Bushmaster Candidates	CAA
N/A	FOREM Short Warning/Mobilization Scenario	DCSOPS
N/A	FOREWON JSOP Exercise - 1973	DCSOPS
N/A	LOC/Port Troop Requirements	DCSOPS
N/A	MBFR War Games and Analyses, Phase II	DCSOPS
N/A	MICV Weapon System Support	TRADOC
N/A	Mobility Requirements for JFM/POM	DCSLOG
N/A	Nonnuclear Ammunition Combat Rates Programing FY 76-80, SEA Allies	ACSFOR
N/A	Nuclear Force Posture	DCSOPS
N/A	Objective Force Deployment Requirements	DCSOPS
N/A	Requirements and Capabilities Automated Planning System Improvement	CAA
N/A	Strategic Force Quick Reaction Capability Improvement	CAA
N/A	Tactical Air Input Data Requirements	CAA
TANREM I	Tactical Nuclear Requirements Methodology, Phase I	DCSOPS
N/A	Tactical Nuclear Warfare Analysis	CAA

N/A	Validation of the Need for a Nuclear Cannon Projectile	ACSFOR
WARF II	Wartime Replacement Factors, Phase II	DCSLOG
WEI/WUV I	Weapons Effectiveness Indices/Weighted Unit Value, Phase I	DCSOPS/CAA

- FY 73 Studies

N/A	Capability of US Lines of Communication and Support Forces in Reinforcing NATO	DCSOPS
N/A	CARMONETTE Model Comparison	CAA
FOREM	Force Requirements and Methodology War Games	DCSOPS
FPP	Firepower Potential Methodology Review, FY 73	DCSOPS
N/A	LEGION Division Game	DCSOPS
N/A	MBFR War Games and Analyses, Phase I	DCSOPS
N/A	Middle Model Review	DCSOPS
N/A	PERSHING II	DCSOPS
N/A	PERSHING II ROC Evaluation	CAA
N/A	Restricted Battle Area Tactical Nuclear Employment Option	DCSOPS
WARF I	Wartime Replacement Factors, Phase I	DCSOPS

## APPENDIX A

### ANNUAL STUDY, WORK, EVALUATION, AND REPORTING SYSTEM (ANSWERS)

This Appendix contains the CAA Annual Study, Work, Evaluation, and Reporting System (ANSWERS) matrix which identifies the five standard categories used to distinguish the various types of major analytical and other work efforts performed by CAA. The chart also contains narrative descriptions of each category and selected qualification and performance criterion.

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Category (type)	Sponsor	Moce	Authority	Tasker	Approval level		Analysis QA		Documentation		
					Sponsor	CAA	Sponsor	CAA	Product	QA	Approval
Study	External	In-house Contract	AR 5-5 AR 10-38	Study Directive • Management Decision Memorandum • RFP	• HQDA Staff Agency Head • MACOM Cdr • AMC • SIMTECH • DOD/DA	Director	• GOSC • SAG • SAG • IPR	ARB	• Usually Study Report • Exceptions-- Dir approval (Note a)	PRB COR	Dir, CAA
Quick Reaction Analysis (QRA)	External	In-house	AR 10-38 (MOD)	Quick Reaction Request	HQDA Staff Agency (Dir/Div)	Director AD (Note c)	HQDA Staff Agency Dir/Div	ARB or Dir desk-side	Memorandum Report	Dep Dir AD	Dir, CAA
Project	External	In-house Contract	AR 10-38 AR 5-5 AR 5-14 AR 10-38	Technical Directive • Management Decision Memorandum • RFP	• AMC • SIMTECH • DOD/DA or Dir, CAA (On behalf of sponsor)	Director AD (Note c)	N/A	ARB	Technical Paper/ Report (Note a)	PRB COR	Dir, CAA
Research and Analysis Activity	Internal	In-house Contract	AR 10-38 AR 10-38 AR 5-5 AR 5-14	CAA FL 40 • Management Decision Memorandum • RFP	Dir, CAA	Dir > 4PSM AD ≤ 4PSM Director	N/A	Dep Dir AD ARB	(Note b)	Dep Dir AD COR	Dir, CAA AD Dir, CAA
CAA Management / Mission Support	Internal	In-house	AR 10-38	CAA FL 40	AD/DCh	AD/DCh	Dir/Div	AD/DCh	(Note b)	Dir/Div	AD/DCh

a. Documentation for contracts will be as specified in the RFP. May be amended by negotiation between CAA and the contractor.

b. Type product is determined by specified CAA approval authority.

c. ADs have interim approval authority for QRA and Projects.



## APPENDIX B

### SUMMARY

HEADQUARTERS, DEPARTMENT OF THE ARMY  
DESERT SHIELD/DESERT STORM AFTER ACTION REPORT  
CAA STUDY REPORT NO. CAA-SR-91-18  
DEFENSE TECHNICAL INFORMATION CENTER NO. DA332020

This report documents the Headquarters, Department of the Army, overview of actions taken during, and issues resulting from, Army operations in support of Operations Desert Shield and Desert Storm (August 1990 - August 1991) in Saudi Arabia, Kuwait, and Iraq.

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**Summary**  
**Headquarters, Department of the Army**  
**Desert Shield / Desert Storm After Action Report**  
**CAA Study Report No. CAA-SR-91-18**  
**Defense Technical Information Center No. DA332020**

This report documents the Headquarters, Department of the Army overview of actions taken during, and issues resulting from, Army operations in support of Operations Desert Shield and Desert Storm (August 1990 - August 1991) in Saudi Arabia, Kuwait, and Iraq. It was compiled and prepared by a team of retired officers selectively recalled to active duty at USACAA for specific areas of expertise applicable to this project (including two CAA alumni). The study sponsor was the Assistant Deputy Chief of Staff, Operations and Plans, for Force Development.

Information was received by staff functional area, validated from alternate sources, and analyzed for sufficiency, utility, and applicability. The 170 observations and issues developed by the team are catalogued into a two-dimensional analog according to Army Headquarters mission area, and the functional phase application to Operations Desert Shield and Desert Storm. Additional subject areas are also reported, and recommended actions are consolidated.

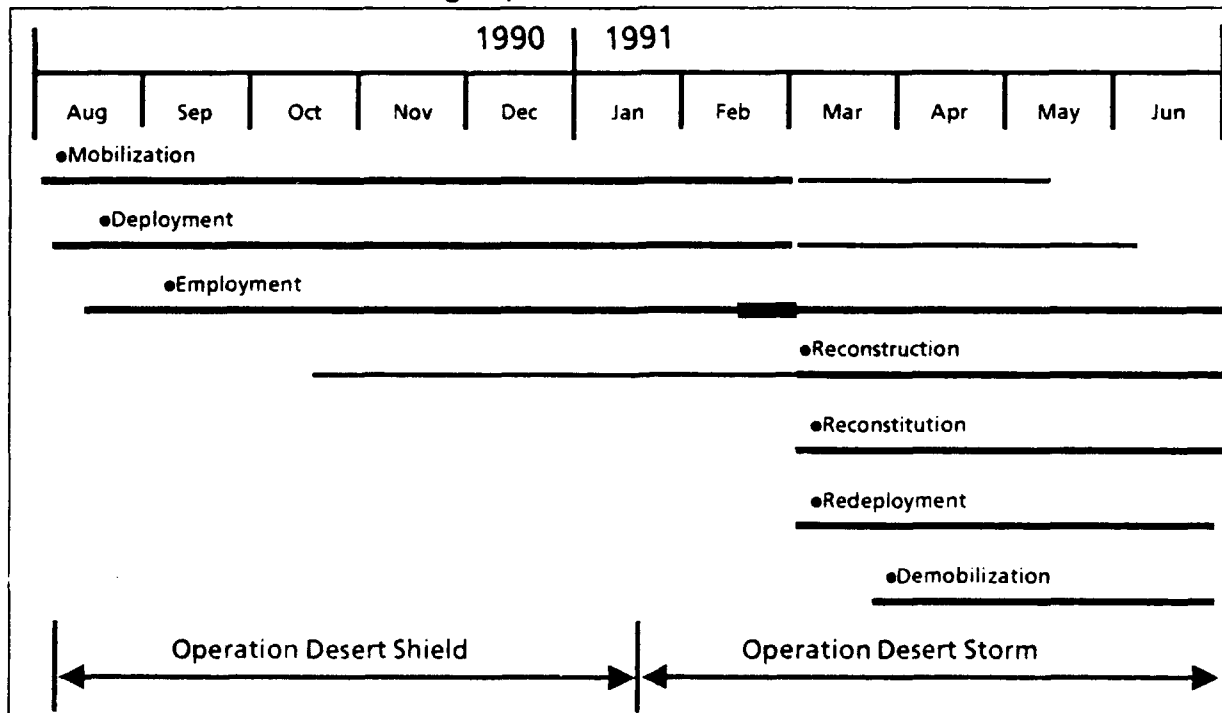
Staff Functional Areas	Functional Phase Applications	Army HQ Mission Areas	Additional Subject Areas
<ul style="list-style-type: none"> <li>• Assistant Secretaries of the Army for <ul style="list-style-type: none"> <li>• FM</li> <li>• IL&amp;E</li> <li>• RDA</li> </ul> </li> <li>• Deputy Chiefs of Staff for <ul style="list-style-type: none"> <li>• Personnel</li> <li>• Intelligence</li> <li>• Operations &amp; Plans</li> <li>• Logistics</li> </ul> </li> <li>• Surgeon General</li> <li>• Judge Adv General</li> <li>• Inspector General</li> <li>• Chiefs of <ul style="list-style-type: none"> <li>• Engineers</li> <li>• National Guard</li> <li>• Army Reserve</li> <li>• Chaplains</li> <li>• Public Affairs</li> </ul> </li> <li>etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Force Mobilization Process</li> <li>• Deployment</li> <li>• Employment</li> <li>• Kuwait Reconstruction</li> <li>• Strategic Reconstitution</li> <li>• Redeployment</li> <li>• Demobilization</li> </ul>	<ul style="list-style-type: none"> <li>• Processes</li> <li>• Command &amp; Control</li> <li>• Manning the Force</li> <li>• Organizing the Force</li> <li>• Equipping the Force</li> <li>• Training the Force</li> <li>• Sustaining the Force</li> </ul>	<ul style="list-style-type: none"> <li>• Intelligence Command, Control, Communications and Processors</li> <li>• Supply Processes and the Industrial Base</li> <li>• "Army Family"</li> <li>• Mobilization Stations &amp; Base Closure Implications</li> <li>• Retiree Recall</li> <li>• Legislative &amp; Non-Legislative Initiatives</li> <li>• Lessons Learned Process</li> <li>• Lessons Not Learned</li> <li>• Environmental Terrorism</li> <li>• Planning for Peace</li> <li>• Information Processing for ARSTAF Decisions</li> <li>• Automation</li> </ul>

Functional phase applications were defined to ensure maximum coverage of activities by active and reserve component units and personnel.

#### Functional Phase Application Definitions (Not Mutually Exclusive).

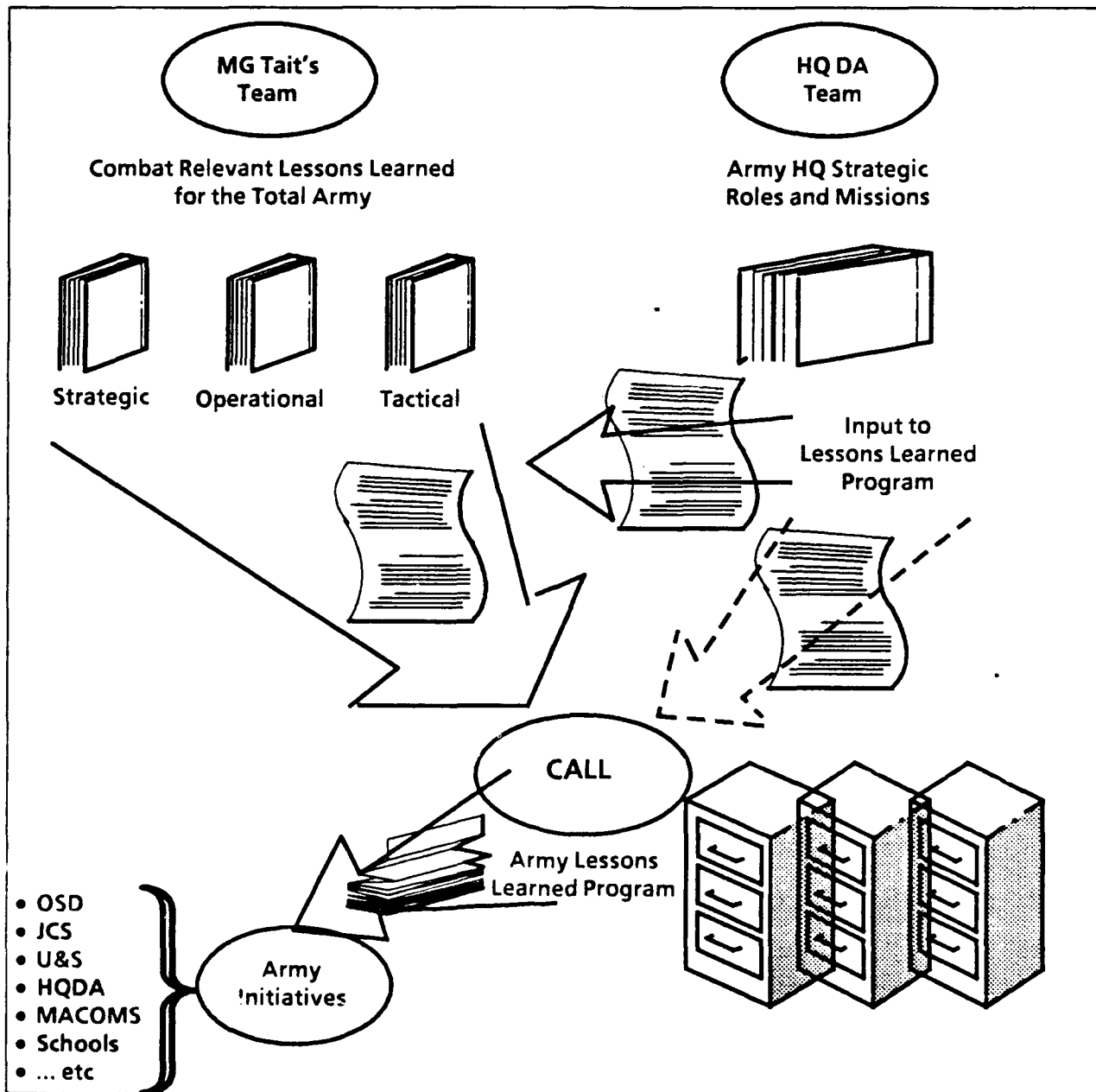
- **FORCE MOBILIZATION PROCESS**
  - Preparing AC & RC Forces to Go to War
  - Alert to Deployment
  - Modernization, Strength Cross Leveling, Training, etc.
- **DEPLOYMENT**
  - Planning & Execution of Road, Rail, Sea & Air Movement of Force Structure to Theater of War
  - Personnel, Unit Equipment, Supplies and Resupplies
  - APOE, APOD, SPOE, SPOD
- **EMPLOYMENT**
  - In-theater Force Preparations and Execution
  - Intel, Comm, Engineer, & CSS Throughout
  - Use of Personnel (Military & Civilian) and Equipment
- **RECONSTRUCTION**
  - Army Role as DOD Executive Agent for Kuwait Rebuild
- **REDEPLOYMENT**
  - Return of Forces and Other Assets Out of Theater to Origin
  - "Putting Back into Geographical Location"
- **RECONSTITUTION**
  - Strategic Level "Putting Back Into Organizational Place"
  - Restoration of Units; Return of Ammo Stocks and Equipment to Other Theaters
- **DEMOBILIZATION**
  - Post-hostilities / Post-redeployment Draw-down of the Force
  - Release of Reserve Components from Active Duty
  - Active Force Strength and Force Structure Reductions

#### Functional Phasing, Operations Desert Shield / Desert Storm



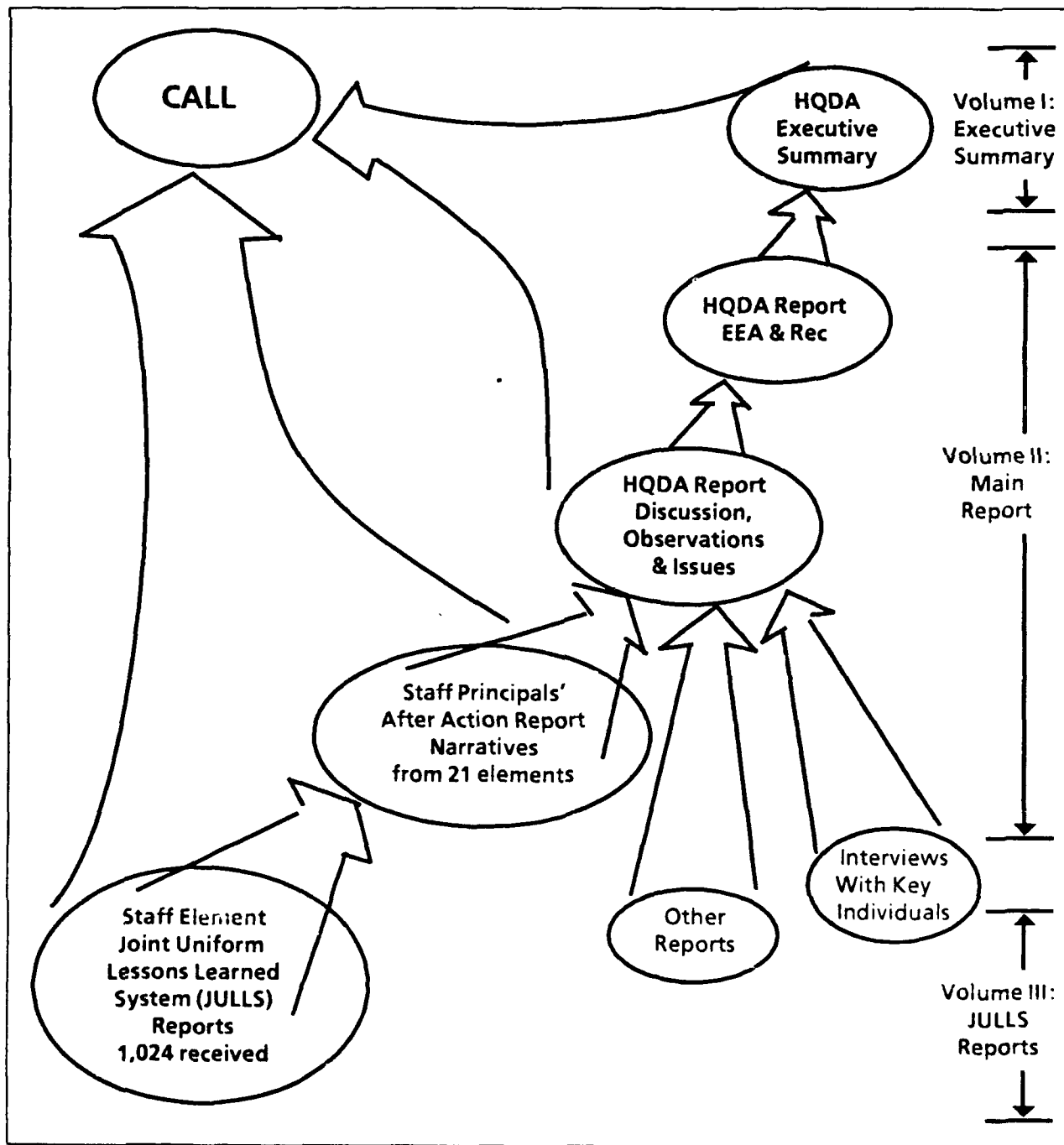
The relationship of this study to the study effort led by MG Thomas Tait at the Center for Army Lessons Learned (CALL), Fort Leavenworth KS is shown below. General Tait was tasked to address "combat relevant" lessons for the Total Army, whereas the CAA team was focused on the Army Headquarters' roles and missions. As the CAA team compiled inputs, those inputs were provided to the CALL team. Drafts of the CAA team's reports were also provided throughout the period of the study so the CALL team could extract and use any information appropriate to its deliberations and reporting. Results of both study efforts go to the Director, Center for Army Lessons Learned, for archiving and for inputs to various Army initiatives aimed at resolution or enhancement.

### Operations Desert Shield / Desert Storm Reporting.



The report is in three volumes: **Volume I** is the **Executive Summary** (Unclassified); **Volume II** (Secret/NOFORN) includes detailed discussion by the study team plus narratives from 21 staff elements; **Volume III** (Secret) contains the 1,024 "JULLS" (Joint Universal Lessons Learned System) reports of issues from the HQDA staff. The study was accomplished in a six-month period, from end-March 1991 to end-September 1991.

#### HQDA After Action Report Hierarchy of Findings.



**Study Team:** The study effort involved the integration of interdisciplinary expertise with a sound methodological approach. The study team consisted of eight retired officers recalled to active duty for this project, plus assistance for most of the study period from the USACAA liaison officer to the ARSTAF, Colonel Wilmeth. The team members were specifically selected by their area(s) of expertise while on active duty, and assigned collection responsibilities from the ARSTAF commensurate with this experience.

Daniel M. Evans, Jr., Colonel, Field Artillery, USA  
Study Director

James H. M. Malley, Lieutenant Colonel, Infantry, USA  
Study Operations, Methodology / Analysis Development and Integration

Garrett E. Duncan, Jr., Colonel, Armor, USA  
Operations Issues Analyst and Mobilization Integrator

George S. Hatch, Lieutenant Colonel, Quartermaster Corps, USA  
Logistics Issues Analyst and Deployment Integrator

Harvey T. Kaplan, Colonel, Corps of Engineers, USA  
Engineer Issues Analyst and Kuwait Reconstruction Issues

Michael M. Morse, Colonel, Adjutant General's Corps, USA  
Personnel Issues Analyst

Harold E. Sprague, Colonel, Field Artillery, USA  
Intelligence Issues Analyst and Employment Integrator

Kenneth J. Strafer, Lieutenant Colonel, Infantry, USA  
Operations Issues Analyst and Chronology Development

## APPENDIX C

### SUMMARY

#### TRANSLATION OF ARTICLES WRITTEN BY M. OSIPOV

This appendix contains a summary of a series of five articles written in 1915 by a Russian named M. Osipov and published in the Russian journal *Military Collection* under the title *The Influence of the Numerical Strength of Opposed Forces on Their Casualties*.



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RESEARCH PAPER

CAA-RP-91-2

## THE INFLUENCE OF THE NUMERICAL STRENGTH OF ENGAGED FORCES ON THEIR CASUALTIES

by M. Osipov

Originally Published in the Tsarist Russian Journal

MILITARY COLLECTION

June-October 1915

ВЛИЯНИЕ ЧИСЛЕННОСТИ СРАЖАЮЩИХСЯ СТОРОНЪ  
НА ИХЪ ПОТЕРИ

М. ОСИПОВ

ВОЕННЫЙ СБОРНИК, 1915

№. 6, 59-74; №. 7, 25-36; №. 8, 31-40; №. 9, 25-37; №. 10, 93-96

Translation of September 1991 by

Dr. Robert L. Helmbold and Dr. Allan S. Rehm  
OFFICE, SPECIAL ASSISTANT FOR MODEL VALIDATION

US Army Concepts Analysis Agency  
8120 Woodmont Avenue  
Bethesda, Maryland 20814-2797

**THE REASON FOR PERFORMING THIS STUDY** was that Osipov's contributions to the development and application of scientific methods to the analysis of combat, while of great historical interest and worthy of emulation even today, are little known and poorly appreciated in the west. This translation will make his work readily accessible to military analysts in the western world.

**THE STUDY SPONSOR** was the US Army Concepts Analysis Agency.

**THE STUDY OBJECTIVE** was to provide the US Army and other western military analysts ready access to Osipov's work and thought. As such, it furnishes a valuable resource for further work in this important field.

**THE SCOPE OF THE STUDY** was limited to preparing the translation, supplying a short preface to place it in context, and providing a translation of some recent Soviet material appraising Osipov's contributions.

**THE PRINCIPAL FINDINGS** of the work reported herein are that Osipov was far ahead of his time, and that his contributions deserve to be more widely known and appreciated by all who are interested in military operations analysis.

**THE STUDY EFFORT** was directed by Dr. Robert L. Helmbold, Office, Special Assistant for Model Validation.

**COMMENTS AND SUGGESTIONS** may be sent to the Director, US Army Concepts Analysis Agency, ATTN: CSCA-MV, 8120 Woodmont Avenue, Bethesda, Maryland, 20814-2797.

## OSIPOV TRANSLATION

This is an English translation of the five-part series of articles that M. Osipov published in 1915 in the Russian journal *Military Collection* under the title *The Influence of the Numerical Strength of Opposed Forces on Their Casualties*. These articles appeared in the following issues of *Military Collection*:

Part One, Issue No. 6, June 1915, pp 59-74

Part Two, Issue No. 7, July 1915, pp 25-36

Part Three, Issue No. 8, August 1915, pp 31-40

Part Four, Issue No. 9, September 1915, pp 25-37

Part Five (Addendum), Issue no. 10, October 1915, pp 93-96

This major work spans a total of 55 pages and contains 9 numbered sections, in addition to an unnumbered Preface and an Addendum. It includes 19 numbered equations, 6 numbered tables in addition to a list of battles, 4 numbered examples, and 10 numbered problems.

We have undertaken this translation because we believe that Osipov's work is so important historically and methodologically that it should be made accessible in English. Its importance derives from the fact that Osipov is the "Russian Lanchester." In fact, the Soviets argue that Osipov discovered both the differential equations commonly known in the West as Lanchester's equations and the relation known as Lanchester's square law. These appeared in Frederick William Lanchester's well-known book *Aircraft in Warfare: The Dawn of the Fourth Arm*, printed by Constable & Co., London in January of 1916. Earlier portions of it (specifically those which present the Lanchester equations and his "N-square" law) had appeared in the British journal *Engineering* during the months of September through December, 1914.

For comparison, Osipov's articles appeared in June through October of 1915, and on all counts seem to have been developed entirely independently of Lanchester's work. In any case, Osipov's many unique contributions are significant and deserve to place him at the forefront of those interested in the theory of combat. For example, starting by solving for the survivors in the case of forces consisting of a single type of unit (namely, infantry armed with rifles), Osipov successively introduces other types of weapons, specifically artillery and machineguns. As they are introduced, Osipov defines "conversion factors" for relating artillery and machineguns to infantry equivalents, and on the basis of historical information estimates that one cannon is equivalent to 100 infantrymen. His approach here is conceptually the same as that used in many of today's aggregated-force models—except that Osipov strives to obtain numerical estimates for his conversion factors from historical data. Osipov also realizes that real battles seldom last until one side is annihilated, and explicitly hypothesizes that a side will be forced to abandon the battle when it reaches a certain percent casualties—which Osipov estimates on the basis of historical evidence at roughly 20 percent. This concept too is often used today, even though it is nowadays well-known to be inadmissible. In addition, Osipov examines certain optimal allocation of force issues, such as whether it is better to split one's forces to oppose each component of an opponent's divided forces, whether to engage forces piecemeal or all at once, etc.

But Osipov's most unique and important contribution is the explicit and systematic application to quantitative historical data of what, for his time, were fairly advanced formal statistical methods. Osipov tests hypotheses and fits theoretical parameters to empirical observations in a thoroughly modern spirit. The outstanding achievement of this approach is the formulation of "Osipov's Law." This states that if

we let  $A$ ,  $A'$  and  $B$ ,  $B'$  be the initial and final strengths of the sides  $A$  and  $B$  (respectively), write

$$A^n - A'^n = B^n - B'^n,$$

and consider values of the exponent  $n$  equal to either  $3/2$  or  $2$ , then we find that the value of  $n$  that best fits the empirical data is  $n = 3/2$ . As far as we know, nothing comparable to this appeared in the literature for another 40 years, until Joseph Engel published his paper analyzing the degree of agreement between Lanchester's equations and the battle of Iwo Jima.

Who Was Osipov?— Unhappily, we know nothing of M. Osipov, the author of this remarkable work. We don't even know his full first name; how old he was when he wrote these articles; whether he survived the foreign and domestic wars, social upheavals, and post-revolutionary attacks on intellectuals and "bourgeoisie" that racked Russia in the first half of this century; or what other materials he may have published. We do not know what his profession was. In these articles, Osipov himself states that he has no practical military experience—but then displays a familiarity with various Russian Field Service Regulations and "planning factors" such as the percent of a unit's troops that would be committed in the assault echelon, the ratio of cannon to infantry, and the doctrinal spacing of troops in assault ranks. Similarly, while disclaiming any expertise in military history, Osipov is often able to cite pertinent historical examples to illustrate his points and displays a general familiarity with military history. Osipov refers to an engineer's handbook for tables of hyperbolic functions and displays a very solid mathematical and statistical analysis capability bespeaking what for his time would have been a very advanced technical education. He also writes very elegantly and with a large vocabulary, possibly indicating a scholarly background. Osipov complains of a lack of time to develop the subject and a hope to return to it "after peace is restored." Was he, perhaps, a young scholar-turned-officer hastily recording his work for posterity while training his unit and preparing to accompany it to the front? What else would explain his persistent complaints about the "press of events"? We would welcome further information regarding M. Osipov.

APPENDIX D  
TABULATION OF MODELS OF INTEREST TO CAA

This appendix contains a descriptive listing of simulations, models, and special purpose ADP systems CAA currently uses in accomplishing its study program.

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## TABULATION OF MODELS OF INTEREST TO CAA

<u>Acronym</u>	<u>Name</u>	<u>Origin</u>	<u>Computer/ Software</u>	<u>CAA Interest</u>	<u>Description and Remarks</u>
AFP	Analysis of Force Potential	CAA 1983	UNISYS 1100/ FORTRAN	RQ, SP	The Analysis of Force Potential (AFP) Model is a division-level model used to estimate the combat potential of actual combat at division level via detailed engagement of various weather/visibility conditions. A separate CS/CSS model evaluates a division's organic capability to support the combat operations simulated. Results from the two models are then merged in an analytic process to determine the overall combat potential of the division. MICAF, the Primary study which uses the AFP model, annually estimates the combat potential of all Army divisions, brigades and ACRs.
CAMP	Computer-Assisted Match Program	CAA (STAG 1972-73)	UNISYS 1100/ FORTRAN	FO, SP	A data processing system which interrelates FASTALS output with information from other data bases, such as Force Accounting System (FAS) and Program Force TUCHA (PFT), to generate unit movement requirements.
CASMO	Combat Analysis Sustainability Model	BDM/VRC 1989	VAX/ SIMSCRIPT II.5	FS	Represents the maintenance base required to support combat operations within a division. Receives data from VIC or FORCEM which represent the combat damage overtime. Based on this damage CASMO generates the maintenance requirements for MOS, parts.
CAS STRAT	Casualty Stratification Model	SSC	UNISYS 1100/ FORTRAN	FS	A table-driven computation algorithm that uses factoring techniques to stratify casualties by grade, category (combat, medical, etc.) and MOS Vulnerability rates for various branches are derived from theater campaign simulations. Loss factors for each MOS within a Branch are determined based upon the vulnerability and density of the MOS. Casualties are then distributed for each MOS within theater based upon the loss factor.



<u>Acronym</u>	<u>Name</u>	<u>Origin</u>	<u>Computer/ Software</u>	<u>CAA Interest</u>	<u>Description and Remarks</u>
CEM VI	Concepts Evaluation Model	CAA 1983	UNISYS 1100 Cray XMP/ FORTRAN	RQ, FO, SP	A two sided fully automated, deterministic model capable of aggregating conventional land and air warfare results as a series of 4-day theater level cycles. The theater cycle includes three subcycles down to a 12-hour division cycle. Force estimation and decision processes are simulated at all four command levels. Three types of terrain, equipment and ammunition resupply, maintenance of vehicles, personnel and unit replacement, and medical support are simulated. The model accepts input data in terms of brigades on the BLUE side and divisions on the RED side, requires a continuous FEBA (piece-wise line or sections) and simulates combat between BLUE brigades and RED divisions over 12-hour time increments. The model accepts killer/victim data produced by a high resolution model to extrapolate to determine losses during the simulated combat. Combat worth of individual equipment is a user input and is used in decision processes and during engagement simulations to assess FEBA movement. Other effectiveness measures reported are loss of major weapons, personnel casualties and resource expenditures.
CFAW	Contingency Force Analysis Wargame	Army War College 1984	VAX 8600 & 11/780 ( + 9560/65 graphics)/ FORTRAN	SP	CFAW is a two-sided, interactive, single echelon of command model designed to simulate one or more corps in a theater-level wargame played on a hexagonal map network. Combat assessments and logistical consumption are aggregated at a level of play (battalion, brigade, or division) dictated by player span of control considerations.
COMO IAD	COMO Integrated Air Defense Model	SHAPE Technical Centre 1981	VAX 8600/ FORTRAN	FS	COMO IAD is a stochastic, critical-event-stepped, Monte-Carlo simulation model which can represent ground-to-air, air-to air, and air-to-ground combat. Game size can vary from one-on-one engagements up to theater force-level simulations. The model

<u>Acronym</u>	<u>Name</u>	<u>Origin</u>	<u>Computer/ Software</u>	<u>CAA Interest</u>	<u>Description and Remarks</u>
COMO IAD (cont)	COMO Integrated Air Defense Model	SHAPE Technical Centre 1981	VAX 8600/ FORTRAN	FS	consists of: (1) a simulation framework (COMO Frame), (2) an input language (COML) to facilitate input of system performance and deployment scenario characteristics, and (3) the COMO Assembly Program (CAP) which integrates the weapon decks within the frame. Weapon decks are used to model weapon system engagement logic. Several adaptations have been made to the original COMO model development by SHAPE Technical Centre in the 1960s. The most commonly used versions are the engineering-level COMO model managed by the US Army Missile Command, and the somewhat more aggregated IAD version used at CAA. The primary difference between the two models is the level of detail in the weapon decks.
CORBAN	Corps Battle Analyzer	BDM	VAX, SUN/ FORTRAN (MIDAS), PASCAL	FS	CORBAN is a time step and stochastic combat simulation of combat between Blue corps and Red armies. It was designed as a screening tool to evaluate changes in operational concepts, doctrine, force structure, and major combat's systems. Functions included are logistics, engineers, close combat, artillery, air and helicopter support ADA, intelligence, target acquisition, and communication. The model has automated command and control.
COSAGE	Combat Sample Generator	CAA 1978-80	UNISYS 1100/ SIMSCRIPT	RQ, FO SP, FS	A two-sided stochastic, high-resolution, division-level simulation model which simulates 24-48 hours of combat to generate consumption and equipment loss data. The units can move, attack, or defend under varied weather conditions. The model can also accommodate battlefield illumination, smoke, helicopters, tactical aircraft, and air defense.

<u>Acronym</u>	<u>Name</u>	<u>Origin</u>	<u>Computer/ Software</u>	<u>CAA Interest</u>	<u>Description and Remarks</u>
CTLS	Concurrent Theater Level Simulation	CAA/JPL	BBN GP1000, SUN, MIPS, RS 6000, HP 700, Transputer, Mark III Hyper Cube/C (object oriented), UNIX, MACH	RS	CTLS is an event-driven, object-oriented stochastic combat model capable of simulating joint regional conflicts ranging in scope from a full-scale theater operation to a small localized combat situation. Major features include user defined echelons of command, C2 plans, air, naval, sensors, and maneuver network. The model is being developed for the parallel, distributed, and sequential scalar workstation processors. It is expected to be operational in FY 94.
FASTALS	Force Analysis Simulation of Theater Administrative and Logistic Support	RAC, for ODCSOPS 1969-70 as part of the FOREWO N system. Major upgrades at CAA	UNISYS 1100, Macintosh, FORTRAN	FO FS	Computes administrative and logistical workloads for a theater campaign simulation and then generates the support force structure necessary sustain the theater combat force. A one-sided requirements model, FASTALS is used in any force planning simulation to develop a force that is balanced, time-phased, and geographically distributed. Major elements of support are maintenance, construction, supply, transportation, hospitalization and evacuation, and personnel replacement. Major use is in studies addressing force structure requirements and capabilities. The model is also used to assess the impact on US force structure requirements of force modernization, logistic alternatives and host nation support contributions.
F-CAP	Force Closure Analysis Program	CAA 1987	IBM PC	SP	The Force Closure Analysis Program (F-CAP) is a tool for operational planners that automates determination of the air transportation requirement and the closure time for a specified unit. F-CAP consists of two interactive personal computer programs, the Force Closure Simulation (FCS) and the Lift Asset Estimator (LAE). FCS allows planners to check the deployment feasibility of an operational plan which uses multiple ports of embarkation (POEs) and debarkation

<u>Acronym</u>	<u>Name</u>	<u>Origin</u>	<u>Computer/ Software</u>	<u>CAA Interest</u>	<u>Description and Remarks</u>
F-CAP (cont)	Force Closure Analysis Program	CAA 1987	IBM PC	SP	(PODs) and incorporates port constraints and airland/air-drop operations. LAE allows planners to calculate the lift assets needed and rapidly computes the possible tradeoffs between different types of aircraft based on the unit transported and the distance flown.
FORCEM	Force Evaluation Model	CAA 1983	UNISYS 1100, SUN 4/ SIMSCRIPT	RQ, FO, FS	The model provides an average value, two-sided, time stepped representation of the theater activities. Presently the minimum time cycle is a 12-hour period. The level of resolution for con.bat units is the division. Combat support and combat service support operations are represented by smaller organizational elements. Road, rail, and water transport routes are given a network representation and terrain features are resolved to a grid square, the size of which may be set as desired (5-30 KM). Functional submodels represent the major activities of target acquisition, communications, command and control, division service support. As an average value simulation, without player interaction, command and control is represented by automated decision processes at three levels in the theater (corps, army group, theater). Assessment of division battle is made through an analytic representation of a division engagement with sets of attrition coefficients calibrated to the results of engagements simulated by an independent division model.

<u>Acronym</u>	<u>Name</u>	<u>Origin</u>	<u>Computer/ Software</u>	<u>CAA Interest</u>	<u>Description and Remarks</u>
GLOFAM	Global Force Allocation Model	CAA 1990-91	Macintosh II/MS EXCEL, LINDO "What's BEST!"	SP	GLOFAM is a rapid-reaction, macro-level, desktop planning model designed to complement more-detailed, higher-resolution models. It provides the planner with an allocation of forces by unit type and number to respond to a specified threat at a desired level of force ratio. Parameters of a scenario are described in terms of warning time, lift capacity, reserve availability, degree of readiness, state of weapons modernization, terrain characteristics, allied forces, and forward-deployment. A linear program is used to rapidly delineate macro level force planning alternatives. Higher resolution models may then be applied to provide greater definition to the choice of alternative.
MICRO-FASTALS	Micro Force Analysis Simulation of Theater Administrative and Logistic Support	CAA 1987	IBM PC and Compatibles/FORTRAN	FO	A PC version of the UNISYS 1100 FASTALS Model (see above). It computes steady state or static (vs time-phased) logistics and administrative workloads for the theater combat force, then generates (roundout) the support force needed to sustain. Other major differences include a more limited geographical theater representation (1 region), no direct inputs based on combat results, fewer workloads (28 vs 48) and number of units modeled. Designed for modeling support structure for small, contingency forces.
MICRO-PFM	Micro Patient Flow Model	CAA 1988	IBM PC Compatibles/FORTRAN	FO	PC version of the Patient Flow model (see description below).

<u>Acronym</u>	<u>Name</u>	<u>Origin</u>	<u>Computer/ Software</u>	<u>CAA Interest</u>	<u>Description and Remarks</u>
NUFAM	Nuclear Fire Planning and Assessment Model	CAA 1976	UNISYS1100/ SIMSCRIPT	RQ	A two sided, stochastic combat simulation that includes target acquisition, nuclear fire planning, and nuclear fire execution with subsequent assessment of damage to section, battery/company, or battalion level units within a division or corps scenario. The model develops nuclear weapon expenditures and assesses the resulting attrition on opposing forces. The model may be operated in a requirements or capability mode.
PFAM	Personnel Flow Assessment Model	CAA	UNISYS 1100/ Q-GERT	FS	A Q-Gert network model used to simulate the flow of personnel and units within a specific regiment in accordance with the policies of the movement plan. The model simulates the following management processes: cohort packages, attrition, promotion, reenlistment, and reassignment.
PFM	Patient Flow Model	DA Surgeon General	UNISYS 1100, IBM PCs/ FORTRAN	FO, FS	An expected value model used to simulate medical workloads required to support both combat and noncombat casualties. Division combat casualties (WIA) from a combat simulation model are processed through FASTALS to provide strength and rates for input to the PFM to produce theater-wide casualty information.

<u>Acronym</u>	<u>Name</u>	<u>Origin</u>	<u>Computer/ Software</u>	<u>CAA Interest</u>	<u>Description and Remarks</u>
Phoenix	Phoenix	CAA 1988	IBM PCs or IBM clones	FS	Phoenix is a planning tool that answers certain strategic and operational questions pertinent to helicopter fleet acquisition and management. It considers the costs of developing, procuring and sustaining different aircraft and, based on these data, produces an optimal schedule for development, production, service life extension, and eventual retirement of the individual aircraft that compose the helicopter fleet. The model is a mixed integer linear program. It obtains the optimal schedule by minimizing the total expenditures for operating and sustaining the fleet over a user-specified planning horizon, subject to budgetary, force structure, and modernization policy restrictions. In the event that these restrictions/policies conflict with one another, a user-specified penalty scheme is employed to resolve the conflict and obtain a solution.
POLICON	POLICON	POLICON Corporation	Modem to Office Machine	SP	POLICON is a political assessment model that uses the concept of expected utility to arrive at a prediction of a group decision. Subject matter expertise is used to first identify competing groups who will determine the outcome of a specific issue. Then an assessment of the individual expected policy positions, relative political power, and degree of commitment on the subject issue of each group must be provided by the expert. With these inputs, the model will provide an expected outcome and assessment of the stability of this outcome. POLICON is used by CAA under license from POLICON INC.
PRISM	Army Prisoner Management Model	CAA 1983	UNISYS 1100/ Q-GERT	FS	A network simulation model constructed within the context of Q-GERT. The model assesses the impact of various changes in confinement policy decisions and environmental conditions in the criminal justice system on the average daily prisoner population.

<u>Acronym</u>	<u>Name</u>	<u>Origin</u>	<u>Computer/ Software</u>	<u>CAA Interest</u>	<u>Description and Remarks</u>
SITAP	Simulation for Transportation Analysis and Planning	Computer Science Corpora- tion, 1968	VAX/ FORTRAN	SP, FS	A deterministic model of an intratheater transportation system. The nodes at which cargo begins and/or terminates movement are modeled at a level of detail to include usage of equipment such as cranes and forklifts. The movement of cargo on vehicle from node to node is also modeled. The use of the model is to determine the throughput of airports, seaports, and the intratheater transportation network.
TADER	Target Acquisition Detection Routine	CAA 1985	UNISYS 1100/ FORTRAN	FS	TADER is a deterministic expected value model which computes susceptibility to detection of generic military units which are scanned by opposing arrays of sensors of various types over a fixed scan period. The detection susceptibility of a unit is denoted as the probability of operational target acquisition (POTA) for the unit.
TRANSMO	Transportation Model	CAA 1973	UNISYS 1100, VAX/ FORTRAN	FO, SP, FS	An intertheater strategic mobility model which identifies movement requirements by tonnage and cargo type. The model accounts for : origin port constraints, troop factors, lost cargo, resupply requirements, and resupply consumption factors.
WAFF	Wartime Fuel Factors Postprocessor	CAA 1973-75	UNISYS 1100	RQ	Develops fuel factors used in calculating fuel war reserves. Uses output from existing CAA high-resolution and theater combat models for scenario-related loss rates of equipment in forward areas.
WARF	Wartime Replacement Factor System	CAA 1973-75	UNISYS 1100	RQ	Produces materiel war reserve factors by combining historical loss rates and rates from combat simulations. Uses existing CAA high-resolution and theater combat models for scenario-related loss rates of equipment in forward areas. Uses historical data for losses in rear areas and/or from causes other than hostile fires.



<u>Acronym</u>	<u>Name</u>	<u>Origin</u>	<u>Computer/ Software</u>	<u>CAA Interest</u>	<u>Description and Remarks</u>
WARS	Wartime Ammunition Rates Systems	CAA 1989	UNISYS 1100/ FORTRAN	RQ	Computes ammunition requirements predicated on the results of modeling a theater level conflict. The WARS uses data provided by the Concepts Evaluation Model (CEM) and the Combat Sample Generator (COSAGE), in addition to data and control information provided by the combat analyst. Produces as output three types of final ammunition reports. These reports detail for each type of weapon/munition combination, the total quantity lost or expended, the tonnages involved, and the rate in terms of rounds/tube day for specified time periods.